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Address of the President (Mr. Campbell W. Fair), Ninth Annual Meeting, Iowa District Gas Association.

During the 1905 meeting of the old Western Gas Association, a coterie of Iowa gas men met in the Congress Hotel, Chicago, and effected the preliminary organization of this Association. Shortly thereafter a call was issued for the first convention, which assembled in the library of the Grant Club, Des Moines, August 24th, with L. L. Kellogg in the chair.

To-day this Association has more than 100 active and over 50 associate members, and the high standard of its meetings is recognized by the fraternity. This happy condition is due, not alone to the growth of the industry, but to the continued interest and efforts of Mr. Kellogg and the other charter members, who are still in the district: Messrs. Austin Burt, E. D. Clary, Jansen Haines, George McLean, Edward G. Pratt and G. I. Vincent.

Aside from our good friends, the appliance men, without whose presence no gas convention would be a complete success, a majority of our members are affiliated with small gas companies—very small gas companies, I may say. Companies serving a population of less than 12,000 are not usually in a position to attend the meetings of our two great national organizations. To such men this Association can be and is of the greatest benefit, for our programmes are invariably prepared from their point of view, and the Secretary and other officers are ever willing to be of assistance when it is within their power. It is to these gentlemen that these few remarks are addressed. There are still a few companies unrepresented on our rolls; but not many. They will all be with us next year, for a certain leading "booster" of Lincoln will see to it that those in charge are convinced that we do not need their $3, but merely want to try to make their paths smoother. That any man who comes to these meetings, seeking enlightenment on a vexing problem, can get it, if not on the floor, then in the lobby of the hotel, from a brother who has been through the "gaff," so that every man returns to his duties from a meeting of this Association with enthusiasm and the ability to do greater things.

The progress made in the various branches of our business during the past year will be covered in the reports of the several standing committees; and I am not going to say a word about what probably interests us all the most—the price of oil—for Col. Elward G. Pratt, than whom no one is more competent, has kindly consented to advise us on this all important subject.

Our legislatures have met, discussed questions of great moment, and adjourned. Now, it is not my purpose to attempt a discussion of legislation, litigation or the tendencies of the times; but I cannot refrain from reiterating what I endeavored to bring out in a paper read at a meeting of this Association several years ago, namely: That a gas company is judged by its employees, and that decent treatment of the public will eventually evoke decent treatment by the public.

The best paper read at a gas convention last year was not written by a gas man, but by a consumer, who made the emphatic statement, "I do not know anything about the gas business;" a progressive and successful business man, Mr. E. Saint Elmo Lewis, of Detroit. Mr. Lewis's subject at the Atlanta meeting of the National Commercial Gas Association was "Efficiency." And he talked straight from the shoulder about "Percy Pinhead," the more or less impertinent youth at the order desk, and "Tillie Timpkins," the gum-chewing female who answers the 'phone at some gas offices. If you have not read this paper, I urge you to do so, and then take home to yourself what you have read, for there is no gainsaying what this keen observer says so forcibly. A friend brought me a marked newspaper last winter, and this is what I read:

"ALL MUST BE COURTEOUS.

"Key City Gas Company Requires Gentlemanliness of Its Employees.

"Requiring greater efficiency on the part of its employees, and demanding that they show great courtesy to its patrons, the Key City Gas Company has caused to be posted about its office, manufacturing plant and elsewhere, neatly printed cards bearing the following:

"The public judges the Key City Gas Company by its employees. Every employee of this Company is regarded as the Company itself, when he talks to the public.

"The reputation of this Company is a complex structure, depending upon the service we give and the personality of every Key City Gas Company man who comes in contact with our patrons. You not only develop your own character but advance your own welfare when you extend the utmost courtesy to everyone you meet in business. You also help the Key City Gas Company to create and conserve the good will of the public.

"Courtesy is an asset; the lack of it a liability."
"Are your manners Gas Company manners?"

In talking of the poster Mr. George McLean said: "It has always been the policy of our Company to require courtesy and proficiency. It has paid in more ways than one, and, as a result, I believe we have one of the most gentlemanly and proficient forces of men in the city."

The attitude and methods of the Key City Gas Company can be emulated with profit by us all, and Mr. McLean's employees are proficient and courteous; but the cards did not make them so. If an employee sees a superior lose patience and hears him make a hasty retort to an unreasonable and abusive faultfinder, all your notices, rules and lectures will not counteract the impression made. Words without deeds amount to nothing.

"We have simply got to put ourselves in the consumer's place, and consider all complaints worthy of immediate and painstaking consideration by an experienced inspector who is temperamentally fitted for his position. We have to go further and make sure ourselves that our employees are all continuously in accord with this policy. Doubtle s all have discovered the fallacy of the idea that an erector can make a gasmaker out of a teamster while the set is be ing installed, and that any roustabout, at all proficient in the art of manipulating a pair of pliers and wrench, can keep gas appliances in good working order. Truly, one of the greatest problems of the small plant manager is the training and retaining of his employees.

About the first question we ask each other at a gathering such as this is: "Well, how many stoves have you sold?" Gentlemen, we are not in the hardware business. We manufacture and sell gas. A small burner under the coffee urn in an all night soup house is a better revenue producer than the cabinet range in the home of the wealthy citizen who spends the winter in California, and the summer touring. Likewise, a light in a pool hall that keeps open as long as the law allows, is worth 10 in a church. Two classes of people can be reached in an effort to increase sales; those who are not using gas at all, and those who are not using it for all the purposes they could with advantage. The number of the latter is so large that free installations, the value and permanency of which are problimetical, are unnecessary; and gratuitous work, beyond rendering service should not be countenanced. Time and money can be advantageously spent in an explanation of the great comfort and convenience of the modern gas waterheater. Every owner of an automobile should have an automatic waterheater in his home; so, you see, the field is a broad one. I refer not merely to the heater of great capacity for the "Bungalow" or "Cottage" type is adequate for any average home, and can be sold at a reasonable price. We have only to avail ourselves of the proffered assistance and co-operation of the agressive manufacturers of these appliances to obtain desirable business.

I am rather inclined to think that possibly some of us are not giving the attention to the illuminating end of our business that we should. The artistic and efficient single units and arc lamps now available, have greatly simplified the problem and the business can be obtained in most cases if the requisite effort is made. However, in the case of municipal electric plants paying no taxes, and being conducted at a loss, the obstacles are practically insurmountable, as flat rates, refunds and concessions of all sorts are included in their scheme of operation. Of course, the gas company must contribute its share in taxes to the support of such an institution.

The programme that has been prepared by your Council will, I am confident, prove interesting and instructive. The gentlemen who will read papers know their subjects. Let the discussions be broad and general. If you have a question to ask, get right up and ask it; and if you have some ideas of your own on a subject, please give them to us. That is what we are here for.

Mr. Clary, and our other Burlington friends, have taken great pains to arrange for our comfort and entertainment, and a most enjoyable time is in store for us. Nothing more is required than that we, all with one accord, enter into the spirit of this meeting.

THE People of Lodi, Cal., are again urging the purchase of the local gas plant, for operation on municipal account. The taxpayers of the named place have been, for quite a while, operating the settlement's water supply and electric current service on various accounts.

Reducing the Boiler Fuel in Water Gas Manufacturing.

[A paper read at the Ninth Annual Meeting of the Iowa District Gas Association, by MR. T. B. GENAY, Des Moines, Ia.]

This paper treats the subject with special reference to the practice at Des Moines, where there are four 125-horse power return tubular boilers. One of the essential requisites of boiler fuel economy is the maintenance of absolutely tight boiler settings, and, therefore, all visible cracks are plastered up with linseed oil and lime, and the entire setting gone over periodically with a candle. Chemical analyses of the stack gases are taken regularly; in one instance the presence of an excessive amount of free oxygen led to the discovery of numerous small air leaks in the stack foundation. The smoke box doors were found to be warped and admitting air. Clamps with long screws were attached to the top and bottom of the doors, enabling the firemen to pull them into place. The arches over the furnace doors were replaced by new arches, made of large keyed blocks.

The location of the discharge of the boiler feed has been studied. The pipe now enters the front of the boiler about 3 inches above the top row of tubes, runs back two-thirds the length of the boiler, crosses over and runs down between the shell and tubes to about the second row of tubes from the bottom. A piece of pipe, 18 inches long, and flared at one end, is attached to the end with a union, and is renewed each time the boiler is shut down. It was found that discharging of the feed water near the bottom of the boiler gave better circulation and prevented the accumulation of sediment.

The 2½-inch blow-off pipe, tapped in the bottom of the boiler, about 18 inches from the rear tube shoot, is connected to the blow-off well with bent flanged pipe. In the combustion chamber the pipe is protected by a triangular brick pier, with the apex toward the front of the boiler. The pipe between the blow-off valve to the boiler is removed twice a year, each boiler having an independent pipe to the blow-off well. City water is connected to the blow off pipe between the boiler and the blow-off valve. This is useful in clearing the pipe when the boiler is full of water and the pressure off, and even also serve as an auxiliary feed line in an emergency. The boilers are blown down twice daily, about half an hour after shutting down, insuring the settling of sediment to the bottom of the shell.

The dampers are operated by an automatic regulator which is constantly inspected and responds to a variation of ¼ pound steam pressure. The regulator is set to close the dampers when the steam pressure reaches a point 2 pounds below that at which the safety valve blows. This reduces needless blowing and consequent loss of steam. The time of firing is governed almost entirely by the damper regulator. In addition to the lever safety valves, the boilers are equipped with pop valves set to blow at a pressure 5 pounds above that at which the safety valve blows. All valves are periodically inspected and ground when necessary. The boilers are equipped with dry pipes and automatic non-return stop valves, in addition to the usual gate valves on the lines to the steam header.

The boilers are equipped with injectors, but the regular feed is by pumps which are of ample size and in duplicate. The steam cylinders of these pumps are lagged with 85 per cent. magnesia and jacketed with bright tin. They are fed from an open type feedwater heater, being placed at a higher elevation than the pumps, practically all of the exhaust steam being returned to the heater, which has an oil filter on the inlet. Under normal running conditions, it is possible to maintain a temperature above 200° F. in the feedwater heater. A chemical tank, containing a solution of soda ash, is placed over the feed pumps, and the mixture from the tank is fed to the top of the feedwater heater by auxiliary pumps operated by the feed pumps. The hot water from the heater is tested daily to ascertain if the proper amount of water softener is being used. The heater is built with cast iron trays and filter cloth which are removed and cleaned periodically, duplicate trays and cloth being provided to make the change quickly.

All of the steam piping, the top of the boilers and the feed water heater are covered with 85 per cent. magnesia. Steam piping, where exposed to the weather, is covered with rubberoid in addition to the regular covering. All buildings except the barn and distribution shop are heated by exhaust steam, a back pressure valve set at 5 pounds being installed on the exhaust line running to the heater. The one exception to this is in the case of the blowing engines, the exhaust lines of which run direct to the food water heater. All of the exhaust steam heating lines and separators are equipped with traps and these are periodically inspected.

The blowing engines are indicated periodically as a check on the valve setting. They are equipped with a throttling valve connected to a hydraulic cylinder and a 3-way cock operated by the gas maker. During the "run" the steam is so throttled that the blowing engine develops only 4-horse power as against 30-horse power when running at full speed. This means quite a saving with an automatic high speed engine which uses approximately 50 pounds of steam per horse power hour. All engines are tested periodically for leaks in cylinders and valves, and pumps also, to ascertain if valves and plungers are tight.

A boiler record book is kept in which all of the work done on the boilers is recorded in detail. A boiler is run for 2 weeks and is then shut down for a week. During the shut down it is cleaned, inspected and repaired by one of the firemen, under personal instructions of the foreman. This fixes responsibility for repairs, insures uniformity in the method of accomplishing them and develops efficient repair men. Our method of obtaining firemen is to select an intelligent laborer to act as helper in the boiler room. When opportunity arises the man is made a fireman. He is taught the proper method of firing and is under the constant supervision of the foreman.

About a year ago three of the boilers were equipped with gravity side feed furnaces of the Dutch Oven type, primarily to comply with a smoke ordinance, but it was soon found that the efficiency of the boilers had been increased. The work of the firemen was decreased, due not only to the increase in boiler efficiency, but to the simpler method of firing. Furthermore, the shaking grates installed with this equipment reduced the number of fire cleanings. The condition of the fires was also greatly improved.

Attention is given to the quality of coal. Coal is received practically at the rate needed to supply the boilers. It is unloaded into cars of about 1-ton capacity and conveyed directly to the boiler room, and a sample of the coal in each small car is placed in a covered can. When the large car is empty the coal in the cans is quartered down, and a representative portion tested in a Crisfield moisture determinator, by which the moisture in the coal is determined quickly and with a high degree of accuracy. The dried sample of coal is burned in a bomb calorimeter, and the thermal value obtained, the calculations being based on an average analysis of the kind of coal used.

Boiler tests are made periodically and to facilitate these a water weigher was designed. This consists of a small tank of measured capacity which, when filled, overflows to a smaller tank raising a float. As the float rises it shuts off the water supply and opens a valve on the bottom of the measuring tank allowing the water to flow into a large storage tank. A float in the measuring tank falls with the water releasing the water in the small overflow tank. The float in the latter tank falls closing the outlet valve on the measuring tank and opening the valve on the supply line. Each cycle of the apparatus is registered by an automatic counter. Thus the amount of water fed to the boiler is accurately measured and recorded, making possibly a continuous boiler test for any length of time, with no additional help in the boiler room.

The following are the results of a recent test:

Data and Results of Evaporative Test.

Made on two horizontal return tubular boilers at Des Moines Gas Works.

Kind of fuel	Iowa Steam Coal
Kind of furnace	Gravity side feed, Dutch Oven [type
Grate surface (2 boilers)	72 Square feet
Water heating surface (2 boilers)	3090 Square feet

Total Quantities.

Date of trial	Dec. 3rd and 4th 1912
Duration of trial	48 hours
Weight of coal as fired	71,801 pounds
Percentage of moisture in coal	6.7 per cent.
Total weight of dry coal consumed	67,100 pounds
Total ash and refuse	14,107 pounds
Percentage of ash and refuse in dry coal	21 per cent.
Total weight of water fed to boilers	412,000 pounds
Water actually evaporated corrected for moisture in steam	394,000 pounds
Factor of evaporation	1.1062
Equivalent water evaporated into dry steam from and at 212°	437,000 pounds

Hourly Quantities.

Dry coal consumed per hour	1,399 pounds
Dry coal per sq. ft. of grate surface per hour	19.4 pounds
Water evaporated per hour corrected for the quality of steam	8,220 pounds
Equivalent evaporation per hour from and at 212°,	9 100 pounds
Equivalent evaporation per hour from and at 212° per square foot heating surface	2.94 pounds

Average Pressures, Temperatures, etc.

Steam pressure by gauge	110 pounds
Temperature of feed water entering boiler	150 degrees
Temperature of escaping gases from boiler	577 degrees
Force of draft between damper and boiler	0.5 incher of water
Percentage of moisture in steam	4 per cent.

Horse Power.

Horse power developed	264-horse power
Builder's rated horse power	250-horse power
Percentage of builders rated horse power developed	105.5 per cent.

Economic Results.

Water apparently evaporated under actual conditions per pound of coal as fired	5.73 pounds
Equivalent evaporation from and at 212° per pound of coal as fired	6·08 pounds
Equivalent evaporation from and at 212° per pound of dry coal	6.51 pounds
Equivalent evaporation from and at 212° per pound of combustible	8.24 pounds

Efficiency.

Calorific value of the dry coal per pound	9,986 B.T.U.
Calorific value of the combustible per pound	12,620 B.T.U.
Efficiency of boiler (based on combustible)	63.3 per cent.

Heat Balance.

Heat given to water	63.30	per cent.
Heat lost in burning C to CO	3.590	"
Heat lost due to unconsumed C in ash pit	2.615	"
Heat lost in dry chimney gas	14.850	"
Heat lost due to moisture from H in coal	2.610	"
Heat lost due to moisture in coal	0.860	"
Heat lost due to moisture in air	0.175	"
Radiation, conduction, etc	12.000	"
Total	100.000	per cent.

The amount of steam delivered to the various machines is always under investigation with a view to its possible reduction. For example, up until 2 years ago the holders were heated with live steam, now the water in the tanks of the storage holders is circulated through the water gas condensers by means of a pump. This keeps the water in the tanks at a temperature of not less than 80° F. during the entire winter, so the only steam necessary for the holders is that required for the cups. The steam going to the ejectors in the cups is measured by calibrated disks and the amount is varied according to the temperature of the atmosphere. This is checked by taking the temperature of the water at three points in each cup, twice daily. When the temperature of the air rises above 35° steam is shut off, and when the temperature falls to 35° steam is again turned on. This schedule, of course, is modified in accordance with the water temperature in the cups. The minimum cup temperature is fixed at 40°, and the warm water in the holder tank materially aids in keeping the temperature above this and also maintains the hydrocarbon dew point of the gas above the ground temperature. It was found that a holder, having a diameter of 120 feet and a capacity of 1,100,000 cubic feet, required an average of 4 pounds of steam per 1,000 cubic feet of gas made, for heating cups in extreme weather. Standard ¾ inch ejectors are installed, one for each cup. Before heating the tanks with condenser water, three were required. The entire heating equipment of the holders is overhauled in the early fall and is inspected at least twic daily while in use.

The following is an approximate table of steam consumption per 1,000 for a plant having an annual sendout of 600,000,000 cubic feet:

Table of Steam Consumption.

	Pounds of Steam Per 1,000. Summer.	Winter.
Generators	30.00	30.00
Circulating pumps (seal)	0.72	0.72
Oil pump to sets	1.31	1.31
Drip pumps	0.34	0.34
Boiler feed pump	2.60	2.60

	Pounds of Steam Per 1,000. Summer.	Winter.
Shop engine	0.61	0.61
Oil unloading pump	0.12	0.12
River water pump	3.00	0.47
Exhauster	7.35	7.35
Pusher engine	1.92	2.00
Hoisting engine	3.47	3.47
Blowers	32.00	32.00
Holder circulating pump	....	1.64
Heating holders	....	4.00
Heating distribution shop	....	3.00
Line loss and condensation	3.50	4.50
Total	86.56	94.47

To recapitulate: Air leaks in settings, leaky smoke box doors, and leaks in firebrick arches over furnace doors are of prime importance, and these defects may be easily remedied. I might add that the painting of boilers, settings and stacks with suitable white water paint improves their appearance, and may possibly reduce some of the radiation loss. The method of installing the boiler feed pipe can readily be used. Care should be taken to keep the feed pipe from touching the tubes, otherwise the tubes may bag at the point of contact. The matter of the blow off pipe is important, and the brick pier is the best means of protection. The use of asbestos as a protection has met with criticism by boiler inspectors. It is claimed that the ash attacks the asbestos causing detorioration, thus allowing the hot gases to come in contact with the pipe. All that has been said about the blow off is within the reach of the smallest plant. Where the size of plant does not warrant the investment in a damper regulator, hand operated dampers are an excellent substitute when intelligently handled. If coal of the western bituminous type, particularly Iowa coal, is used, medium depth fires and heavy firing give good results. It is imperative that a boiler be equipped with two safety valves, one of the lever, and one of the spring type. Daily inspection of these valves is just as important. Dry pipes are a protection to engines, because they insure dry steam, and dry steam also increases the capacity of the water gas sets. Therefore, dry pipes are essential and the cost of their installation is not excessive. Non-return automatic stop valves add to the safety of the plant when two or more boilers are in operation.

All boilers should be equipped with an injector, but it should be used only in case of emergency, the feed water heater and boiler feed pumps being a strong factor in the reduction of boiler fuel. The temperature of the feed water plays an important part in the performance of a boiler, a rise of 100° in feed water temperature meaning approximately a gain of 1 per cent. in boiler efficiency. If the size of plant does not warrant the installation of a standard type of feed water heater a homemade one of the open type makes a good substitute. Where feed water purification is necessary it should be done in the heater and not in the boiler.

All steam piping for live or exhaust steam should be covered with heat insulating material. It is also advisable to have steam piping above ground as it facilitates inspection and reduces the cost of repairs. Steam traps should be installed on all separators and heating coils, and the discharge of the traps should be connected to the feed water heater.

It is advisable, if possible, to buy coal with some guarantee as to its thermal value and to have some means of checking the same.

The method of selecting a fireman, as stated above, must be again emphasized. It is certainly better to teach an intelligent laborer than to hire some of the so-called firemen.

Periodic boiler testing is practically a necessity.

The heating of holder cups and tanks is well worth investigating as considerable saving can be made with a little careful study.

The writer believes that even in the smaller plants, a careful and intelligent study of the condition and steam consumption of each steam using unit, will often lead to simple and inexpensive changes and repairs that will bring about gratifying economies.

THE Mobile (Ala.) Gas Company has concluded a most creditable exhibition of modern gas appliances, arranged for display and demonstration in its headquarters, 18 South Royal street. The exhibition, which was entirely along educational lines, was largely attended, and lasted one week. Notable in the demonstration were: Lard rendering, smoking sausage, candy making, and shop equipment. The exhibition was opened to the public from 10 A.M. until 9 P.M.

The Automatic Lighting and Extinguishing of Street Gas Lamps.

[Prepared for the JOURNAL, by MR. J. A. SEAGER, Bristol, England.]

In Great Britain much attention has recently been given to the amount of time and money lost in the lighting and extinguishing of street gas lamps, sending men round the streets to turn on and off the jets, and to light them in succession, by means of a torch or similar apparatus. Each man has to be paid for his time, including that taken in getting to his "round," and it is impossible to turn all the lamps on or off simultaneously, with the result that gas is needlessly wasted, owing to the time interval occupied in going the round, and the personal element of slowness and negligence enters into the way in which the lighting of the district is done. Attempts have, therefore, been made to introduce simple and automatic means for turning the gas on and off and lighting it by direct control from the gas works. In this way there is considerable saving in gas and labor, and, on a properly arranged system, also in mantles and glass. It was early recognized that such central control could be very effectively produced by the emission of a wave of extra pressure from the gas works traversing the whole of the mains, and effecting some form of control apparatus fixed to each lamp. At the outset such pressure systems were dependent on predetermined pressures; but as such pressures cannot always be guaranteed throughout a district, attention was directed to the development of systems that could work with varying pressures. It was necessary in such systems to be able to differentiate between intentional and accidental variations or rises of pressure.

A very interesting apparatus of this type is constructed on the Broadberry patents, by the Telephos Domestic and Street Lighting Company, London, a prominent feature being that the apparatus distinguishes between slow and quick rises, because, while involuntary variations take place comparatively slowly, or sometimes quickly to the extent of 1 or 2 tenths, the intentional rise can always, and, under any circumstances, be made comparatively quick. Even where the governors are controlled by weights, it can be easily arranged that the ordinary increases of pressure be put on slowly. Pressures, for working the Broadberry apparatus are applied quickly, and the method adopted will be understood by considering the diagram, Fig. 1. When two vessels are placed one within the other, the inner vessel having a pinhole in its bottom, if liquid is poured between the two vessels sufficiently slow, it will percolate through the small hole into the lesser vessel and the latter will remain stationary; if, on the other hand, the liquid is poured in

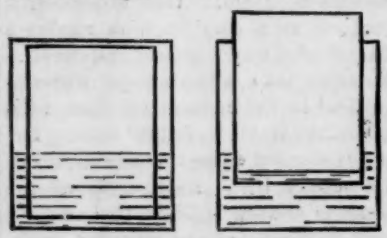

Fig. 1.

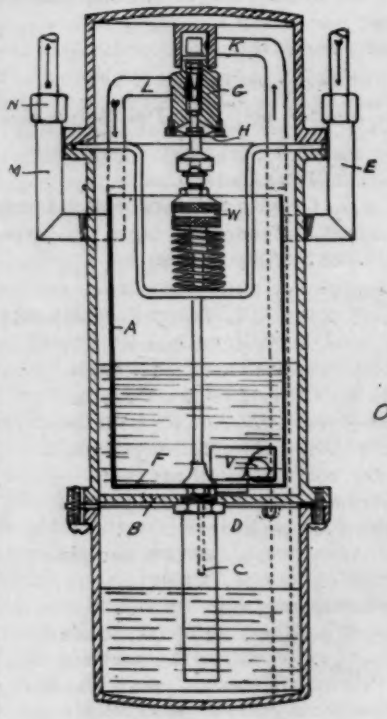

Fig. 2.

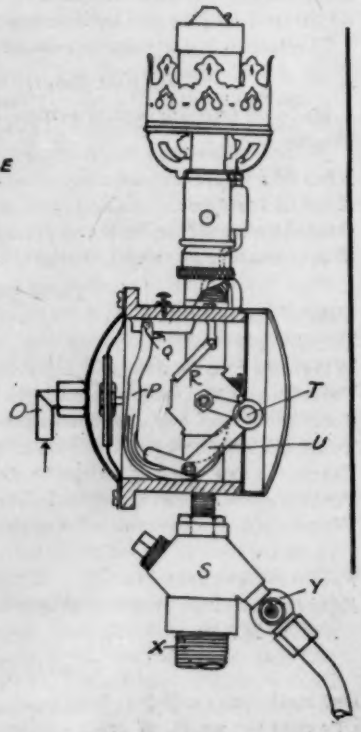

Fig. 3.

quickly the smaller vessel will rise and the levels of the liquid will equalize slowly. The smaller vessel will then return to its original position and the process can be repeated. In the Broadberry apparatus the upward movement of a small vessel is utilized to open a small gas valve leading to an operating chamber, and the equalizing movement is used to close the valve and open the outlet from the chamber. The apparatus is, therefore, operated by a wave of pressure, say .6-inch, produced by loading the governor with weights, and an examination of Figs. 2, 3 and 4 show how well the system has been worked out. Fig. 2 illustrates a section of the valve box, made of specially prepared, non-corrosive metal, in order to render the apparatus durable. This box is divided into two chambers, the lower being filled with a non-freezing, non-evaporative mixture of glycerine and water, the upper one containing a spring-balanced metal float, also of non-corrosive material. Between these two chambers is a horizontal partition, *B*, through which a glycerine passage is made by a brass pipe, *C*, passing downwards nearly to the bottom of the lower chamber. In the wall of the valve box is drilled a longitudinal hole, having an outlet to the bottom chamber at the point, *D*. Into this hole is led an elbow, *E*, connected to the stand pipe of the lamp.

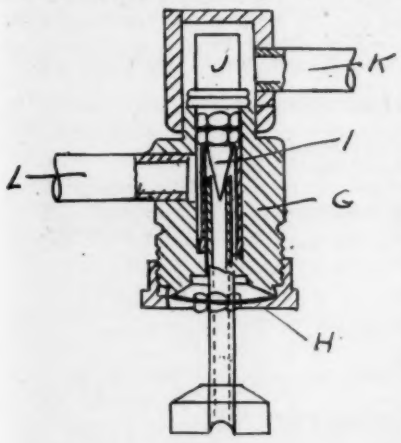

Fig. 4.

The pressure of the gas issuing from *D* causes the level of the glycerine in the bottom chamber to fall, and the surplus liquid is forced through the tube *C*, into the top chamber, until the difference in levels coincides with the actual prevailing pressure. The float *A* has in its bottom a small hole, *F*, of a size sufficient to allow the glycerine to flow at a given rate into the interior of the float. If the pressure rises slowly the levels of the glycerine inside and outside the float will rise simultaneously and no movement of the float occurs. If, however, a sharp rise of pressure takes place as, for example, when intentional pressure is put on at the works, the level of the glycerine outside the float is lifted. The float is guided by a brass rod which, on its up stroke, comes into contact with the valve, *G*. This valve consists of a weighted, hollow spindle coned at the upper end, to which is attached a small diaphragm, *H*, a secondary tappit carrying the internal cone, *I*, and a specially prepared cap, *J*, resting upon a ground seat. This will be most clearly seen in Fig. 4, which gives the details of the valve. When the float rises it first of all raises the hollow spindle until this cone fits over the internal cone of the secondary tappit, and then, carrying the hollow spindle and the secondary tappit still further, it finally raises the cap clear of its seat, thus allowing a free passage of gas, at full pressure from the elbow, *E*, through *K* and *L*, and thence, by way of the elbow, *M*, to the operating mechanism shown in Fig. 3, the connection for this being made between *N*, Fig. 2, and *O*, Fig. 3. The operating mechanism which develops the power for turning the gas on or off, and which is shown from the clearing socket, *S*, to the burner fittings, consists of a vertical diaphragm in a metal box. The shaped lever, *P*, is suspended from a pivot, *Q*, and when the diaphragm moves outwards in a horizontal direction it turns by means of the ratchet wheel, *R*, the cock of the main burner supply to open or closed position, as desired. The weight, *T*, suspended by a double link movement, *U*, is simply used to give an equal operating power throughout the whole travel of the diaphragm.

Special reference may be made to the cock, which consists of a longitudinal plug, turning in a correspondingly shaped body, and held in position by a special clip. This makes the cock easy of access, it is free from nuts or screws; and generally simplifies cleaning, as the plug of the cock can be removed by simple pressure of the finger. Another point to be noted is that no working parts of the apparatus are inside the gas flow, hence there is much less risk of stoppages from naphthaline or other deposits. Moreover, the gas supply to the burner goes straight from the standpipe, *X*, and not through the actuating apparatus.

When the float has risen and lifted the valve, and the gas is passed to the operating mechanism, which in turn opens the gas-way of the burner, the apparatus has performed its work of lighting the lamp. When the operation is completed the glycerine passing from the small hole, *F*, gradually reaches the same level inside the float as outside, rendering it no longer buoyant, and the float drops. This movement closes the inlet, *J*, of the valve, *G*, and at the same time opens the outlet. The diaphragm then recedes, the curved lever engages in the next step of the ratchet, and the apparatus is ready for the subsequent operation of extinguishing, when all that is necessary is another sharp rise of a few tenths to turn off the cock. In districts where the pressure falls rapidly before lighting up time, and when rising attains a level not higher than previously recorded, provision is made to deal with the problem by introducing a special valve, *V*, which allows the glycerine to escape out of the float as quickly as the level around the float falls. In this way the apparatus is brought into position to respond at any time to a given increase. The float, *A*, counterbalanced by the spring, can be adjusted so as to be in close contact with the valve, *G*, in its normal position, or further away as required. The nearer it is in contact with the valve the smaller increase of pressure required, while the further away it is the greater the increase of pressure necessary. This is changed by simply raising or lowering the adjusting nut, *W*. It will be seen that the riser can be cleaned without dismantling the apparatus; the by-pass consumption is reduced to a minimum as it works intermittently with the burner supply; electric ignition can be used where desired; it is easily adapted to any existing make of lantern, and to any known type of burner, whether upright, inverted, self-intensifying or high pressure. It, therefore, can be said that the Broadberry apparatus, being a valuable means of reducing the day-by-day expense of a public gas lighting system, is, therefore, worthy of very careful consideration.

Gas Plant Residuals—Tar and its By-Products.[1]

[A paper read by Mr. S. R. Church, before the Southern Gas Association, April, 1913.]

Our country has, in a little over a single century of existence, so far depleted her stupendous natural resources—resources once thought inexhaustible—that a widespread and very definite movement is in progress, whose object it is, not only to prevent waste, but to turn the waste of yesterday into the profits of to morrow. In your industry, the manufacture of gas for light, heat and power, you have been saving your residuals, at least in part, for the biggest portion of the existence of the industry. However, it cannot be doubted that with the advent of the by-product coke oven the gas engineers of this country began to devote more attention to by-products.

My paper will be confined to presenting some data, most of which is heretofore unpublished, concerning tar as a raw material, and the products derived from it, together with some requirements that these products have to meet.

A very considerable business in the refining of the by-products of the gas works had grown up before the introduction of by-product ovens. This industry, based on gas works tar and ammonia liquor, was developed independent of the gas works engineers and managers, by a number of entirely separate concerns and individuals.

It is impossible, within the limits of this paper, to trace the history of the development of the tar industry, and I will pass at once to a discussion of your residual product, the raw material of the tar distiller.

Tars are defined as "bitumens which yield pitches on fractional distillation, and which are produced as distillates by the destructive distillation of bitumens, pyro-bitumens, or organic materials." The place of tars in the field of bitumens is not very widely understood, and it is only within recent years that a classification of the bodies termed bitumens in accordance with their production, origin and usage, has been attempted. The following diagram, illustrating the origin of bitumens, is based on a paper by D. Holde and J. Marcusson.

The technical uses of bitumens are so varied that it would be impossible for me to attempt even a hasty enumeration of the varied industrial applications of the products of tar. Of course, in very many of these uses, tar products compete directly with natural or artificial asphalts or petroleum residuals. This is becoming a more important factor in the situation every day, as the production of petroleum residues is stimulated by the increasing demands for gasoline. The extensive opening up of fields of oil high in asphaltic content, has put on the market a series of residual products that for

1. This paper is slightly abridged.—Eds.

CLASSIFICATION OF BITUMENS.—I.

- *NATURALLY OCCURRING BITUMENS.*
  - SAPONIFIABLE (chiefly wax esters) — Geologically the earlier stages of the non-saponifiable
    - Sapropol wax.
    - Algae wax.
    - Lignite bitumen.
  - NON-SAPONIFIABLE.
    - Solid and viscous sulpurized and oxidized hydrocarbons.
      - Natural asphalt.
      - Maltha.
    - Chief constituents hydrocarbons.....
      - Natural gas.
      - Earth wax (ozokerite)....
        - Paraffin and oil.
        - Cable wax.
      - Petroleum (crude oil)....
        - Distillates.....
          - Oils.....
            - Benzine and naphthas.
            - Kerosene and burning oils.
            - Gas oil.
            - Mineral lubricating oils.
          - Petroleum paraffins.
        - Residues.....
          - Liquid lubricants.
          - Viscous (flux) oils.
          - Hard residuals.....
            - Petroleum pitch.
            - Oil asphalt.
            - Blown products.

CLASSIFICATION OF BITUMENS.—II.

- *ARTIFICIAL PRODUCTS..* (Prepared chiefly by destructive distillation of organic natural products or crude bitumens.)
  - I.—*Lignite Tar*.....
    - Distillates—Lignite tar oils.
    - Residues—Lignite tar pitch and coke.
  - II.—*Shale Tar*.....Distillates
    - Shale tar oils.
    - Shale tar paraffine.
  - III.—*Coal Tar*.....
    - Distillates—Coal tar light, middle and heavy oils.
    - Residue—Coal tar pitch.
  - IV.—*Wood Tar*..... (Hardwood, Pine)
    - Distillates—Pyroligneous acid, wood tar creosote.
    - Residue—Wood tar pitch.
  - V.—*Fat Tar* (Fat Pitch) .....Residues of fats (palm, wool, fatty acids, etc.) stearine pitch, wool pitch, candle tar.
  - VI.—*Peat Tar* .....Formed by dry distillation of peat.
  - VII.—*Oil Gas Tar*.....Produced by "cracking" of crude oils or distillates of some in "oil gas" manufacture.
  - VIII.—*Water Gas Tar* ..... Produced by "carburetting" water-gas with gas-oil.
  - IX.—*Bone Tar, Molasses Tar* Produced by dry distillation of bones, molasses, or alcoholic liquors.
  - X.—*Resin Pitch*.....Residue of distillation of "Colophony."

road binders, paving, and to some extent for roofing and waterproofing, compete with coal tar pitch and the older forms of asphalts commonly used.

Until about 20 years ago, gas works constituted the entire source of tar. In 1894 the first by-product coke oven plant in America was erected at Johnstown, Pa., for the Cambria Steel Company; but they had been in operation in Germany since 1881. At the present time, the by-product coke ovens produce about two-thirds of the total tar production of the country which was estimated as 165,000,000 gallons for 1912. The rapidity with which the production of this tar is increasing, is indicated by the fact that during the year ending September, 1912, there were installed plants having a capacity of approximately 35,000,000 gallons of tar per annum. If all the coke now made in beehive ovens was made in ovens of the by-product recovery type, the additional production of tar per annum would be about 375,000,000 gallons. Doubtless there are many of you present here who are better qualified than the writer to predict what lines the future development of the gas industry will take. Until very recently, it seemed that the production of gas works coal tar would be largely reduced by the growing popularity of installations for the production of water gas. The present production of water gas tar is impossible to estimate, as a great deal is burned by the companies producing it. It may be in the neighborhood of 50,000,000 gallons. The success in England of the vertical retort installations for making coal gas, and recent installations of this type in the United States, indicates the possibility that this development, together with the increased cost of gas oils, will cause the production of water gas to remain stationary, or possibly to decrease.

R. P. Perry, in a paper on the Development of Tar Distillation in the U. S., says that:

"Depending upon the coal used, and more particularly upon the size and shape of retorts, the travel which the gases make over the hot surfaces, and the temperatures to which the gas is subjected, the coal tars vary within wide limits. In general with the vapors subjected to the higher temperatures usually characteristic of gas works as compared with coke works, there is an increase in specific gravity and free carbon. For example, the tar from many gas works will average about 1.24 specific gravity at 60° F., and about 25 to 30 per cent. free carbon by weight, whereas from the by-product coke ovens the specific gravity would average more nearly 1.19 and the free carbon would be about 5 to 18 per cent., the average being less than 10 per cent."

The late Dr. H. W. Jayne, in a paper before the Fifth International Congress of Applied Chemistry at Berlin, in 1905, said that:

"The influence of the temperature used in carbonizing is strikingly shown by the test of 2 tars, both from the same coal, and made in the same kind of ovens. One plant was producing gas as its main object. The tar from this plant had a gravity of 1.21 and tested 17.5 per cent. of carbon; the light oil fraction was 2.2 per cent. of a gravity 0.979, testing 23 per cent. to 170°; the total acids in the tar oils were 3.6 per cent.; and the dry pressed naphthaline 7.4 per cent. In the second tar, in which coke was the main object, evidently much lower heats were used, the tar having a gravity of 1.137, and testing 3.2 per cent. of carbon; the light oil amounted to 11.9 per cent., and had a gravity of 0.970, testing 28 per cent. to 170°, or 6 times more crude naphtha than in the first tar; the total tar acids were 12.48 per cent. while the pressed naphthaline fell to 1.2 per cent. It is evident that in the first tar the light hydrocarbons and tar acids have been destroyed by the temperature employed, with formation of naphthaline."

From a series of analyses made a few years ago at one of our laboratories, and from recent analyses made in the writer's own laboratory, the following were selected as typical of the tars produced in the United States.

It is from these raw materials of varied physical and chemical characteristics that we have to derive marketable products. While some of these products, such as carbolic acid and its homologues; benzol and its homologues; naphthaline, pyridine, etc., are definite chemical compounds, and hence are the same no matter from what kind of tar derived, by far the greatest portion of the tar is worked up into crude products obtained, by fractional distillation, as distillates or residual products, and varying in composition according to the variation of the crude tars from which they are produced. Therefore, in considering the value of any given tar, it is necessary to determine not only what it will yield in the definite chemical products aforementioned, but also what will be the value of those other products, more important from the tar distillers' standpoint, namely, creosote oil and pitch.

I will not attempt to even enumerate the products that *can* be ob-

ANALYSIS OF TYPICAL TARS.—(*All Tests on Dry Tar.*)

	Gas Retort.				Coke Oven.			Water Gas.
	Horizontal.		Inclined.	Vertical.	United Otto.	Semet-Solvay	Koppers.	Eastern.
Specific gravity at 15.5° C.	1.266	1.293	1.238	1.153	1.207	1.188	1.186	1.083
Free carbon (insoluble in C_6H_6)	28.9	37.5	24.3	....	13.3	10 7	6.8	0.1
Specific viscosity (Engler at 100° C.)	21.8	30.0	14.9	2.1	3.4	3.0	2.1	1.6
Oil to soft pitch 60° C. m.p. (pr. ct. by volume)	13.2	.....	14 3	28.8	21.2	21.8	35.3	43.1
Pitch residue 60° C. m.p. (per cent. by volume)	86.8	.....	85.7	71.2	78.8	78.2	64.7	56.9
Refractive indices at 60° C. (taken on oil)	1.5932	.....	1.5807	1.5755	1.5987	1.6122	1.6139	1.5678
Sulphonation residue (per cent. taken on oil)	0.4	.....	2.4	4.3	....	....	....	8.0
Tar acids (per cent. taken on oil)	14.0	.....	21.0	29.0	12.0	4.0	.....	.....

tained from coal tar, but will confine myself to a brief consideration of the principal products that are at present produced in this country, and attempt to show what the requirements for the principal products are, and the relation existing between these requirements, and the characteristics of the original tars.

The proper uses of crude tar are very limited. Perhaps the largest uses have been for coating iron pipe and for road surface. Some crude tars, whose content of water and free carbon is not excessive, have been satisfactory for pipe coating, while other crude tars have proved unsatisfactory. For road treatment the use of crude tar is undoubtedly bad practice in most cases, and the failures of roads treated with crude tar or improperly selected refined tar, have made it harder to promote the use of tar products for road treatment.

Before anything can be done with tar, it is necessary to get some of the water out of it. The gas works manager may have only a very indefinite idea of the wonderful products contained in his tar, but he is likely to have definite knowledge of the fact that it contains H_2O in varying quantities, and that it is hard to divorce these highly incompatible substances. From an examination of records covering a period of 8 or 10 years, I estimate that the percentage of water left in the tar by the gas works should not exceed 7 or 8 per cent., unless the tar is unusually high in free carbon, these tars frequently carrying 20 to 30 per cent. of water. Removing the water by distillation is effective, but expensive, and will soon be considered bad practice. I cannot describe the most recent method of dehydration introduced by the tar distillers, but it is based on the conclusion that water, having a specific heat 2½ to 3 times that of tar, and increasing in volume 1,600 times when converted into steam, should, therefore, be driven out by heating a thin film of tar and not by boiling in a still.

The first fraction from the distillation of coal tar has a gravity lighter than water, and constitutes the source of most of the highly refined substances already referred to as definite chemical substances. An analysis of 26 tars, of which about half were coke oven tars and half gas retort tars, yielded an average of 2.4 per cent. of light oil, varying from 0 to 4 per cent. In working up this light oil approximately 40 per cent. yield of benzol, toluol and heavier solvents is obtained, averaging about 1 per cent. of the tar, the variation in the yield of benzol and solvents being from 0 to 2 per cent. of the tar. Light oil is worked up into refined products at only a few tar refineries, it being customary to concentrate this operation at some one point, shipping the crude light oil from the various refineries to this plant, as the production of pure benzol and kindred products requires an expensive installation. The process includes re-distillation of the crude light oil, treatment with sulphuric acid and alkali to remove impurities, and steam distillation in column stills to separate the various fractions and finally secure pure products of constant boiling point. Benzol and the kindred coal tar solvents are used in many industries, and have to meet rigid requirements as to purity. The different grades of "benzols" made at one refinery are:

Pure benzol	(Boils 80 to 91° C.)
100 per cent. benzol	100 per cent. at 100° C.
90 per cent. "	90 per cent. at 100° C.
50 per cent. "	50 per cent. at 100° C.
Pure toluol	110 to 112° C.
Pure xylor	135 to 145° C.
Solvent naphtha	90 per cent. at 160° C.
Heavy naphtha	85 per cent. at 200° C.

Carbolic acid is another product which is derived directly from light oil, and its manufacture requires exceedingly careful manipulation, involving a number of re-distillations, the final one usually under vacuum.

Naphthaline is another pure product obtained from the light and middle oil fractions. The crude naphthaline, after removal from the oil by freezing and filtering, is re-distilled, chemically washed and crystallized or sublimed. It is produced in various forms, such as flakes, balls, etc.

The successful working up of coal tar includes the production of a marketable grade of creosote oil, which can be disposed of to good advantage. As the requirements for this product have been very much more closely defined of late than formerly, it may be well to devote considerable attention to this subject. Creosote oil formerly included the entire distillate after the small light oil fraction has been removed. In American practice it is general to carry the distillation to a point where the pitch is of the proper consistency, controlling the distillation by tests of the pitch. While the character of the creosote oil depends largely on the tar from which derived, its distillation range is, of course, largely dependent on the hardness of pitch made. The accompanying table gives the analyses of oils derived from 26 tars, run to roofing pitch, and the same tars run to harder pitch, such as used for briquetting.

Distillation Tests of Creosote Oils from Twenty-six Typical Tars.

Tar No.	Per Cent. Creosote to Soft Pitch.	Per Cent. Creosote to Hard Pitch.	Creosote to Soft Pitch. 210°	Creosote to Soft Pitch. 235°	Creosote to Hard Pitch. 210°	Creosote to Hard Pitch. 235°
1	20.0	25.7	9.4	56.6	4.1	37.6
2	15.5	19.2	24.7	65.3	15.0	53.7
3	16.6	23.2	30.6	63.7	9.9	40.8
4	15.7	19.5	28.3	65.4	14.7	54.2
5	21.3	27.6	18.5	59.7	12.4	47.9
6	20.0	25.5	32.6	69.8	21.4	56.0
7	18.7	24.2	23.1	73.7	13.6	50.8
8	17.8	23.0	32.6	69.6	18.0	55.3
9	33.0	40.7	2.5	33.3	1.6	24.7
10	21.3	24.7	1.3	26.6	2.5	16.0
11	25.7	32.7	18.0	59·3	10.0	37.7
12	21.5	27.0	6.1	45.4	3.7	28.8
13	14.5	17.8	13.8	64.9	10.6	54.1
14	29.2	36.9	12.7	47.5	9.1	32.9
15	25.7	30.2	24.0	58.9	18.3	50.9
16	25.2	30.4	15.3	52 4	10.2	41.0
17	21.7	28.6	32.2	66.1	20.0	51.5
18	20.3	26.1	9.8	51.8	6.0	40.1
19	13.6	19.9	1.5	27.7	2.4	13.4
20	16.6	22.3	23.4	62.3	14.6	50.6
21	15.8	21.6	30.1	68.8	20,3	56.7
22	23.8	31.1	24.7	60.8	13.7	46.3
23	12.7	15.0	14 3	65.0	11.7	55.0
24	18.8	25.3	5.4	55.4	3 3	35.9
25	14.5	18.0	20.4	63.4	16.5	56.5
26	11.7	17.2	16.9	64.8	7.0	46.9
Average	19.7	25.1	18.1	57.6	11.2	42.7

The controlling requirements in practically all specifications for creosote oil are first, the origin of the oil; second, its distillation range. Many other requirements are included, but although their presence in the specifications causes the producer a lot of extra work and worry, these other tests are usually intended to be in accordance with the characteristics of an oil having a certain distillation test. Although a few years ago most of the creosote oil made was was sold "as is," there is very little sold to-day except under specifications. I have compiled and indexed the 138 creosote oil specifications under which we are now disposing of our product. 114 require specifically that the oil shall be a pure product of coal tar; 15 have no definite requirement as to origin; 8 permit an admixture of oil from water

(*Continued on page* 342.)

THE AMERICAN GAS LIGHT JOURNAL

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NEW YORK, MONDAY, MAY 26, 1913

[Official Announcement.]

Joint Session, American Gas Institute and the Illuminating Engineering Society.

A joint session of the Illuminating Engineering Society will be held, during the third week in October, at the annual meeting of the American Gas Institute in Richmond, Va. While it is true that a number of gas men are active and influential in the work of our Society, still a regret is frequently expressed that gas men, and gas companies generally, do not take a more active interest. The gas business is so intimately bound up with our purposes and objects, that it seems unnecessary to dwell on the value of our Society to that great industry.

Your Committee believes that this joint meeting will furnish an excellent opportunity for the arousing and stimulation of such an interest. It urges on the membership of our Society the importance of a *large attendance* at this joint meeting, and of an abundant discussion of the papers presented to it.

We are notified by the Committee on Papers that the following papers have been secured:

"Some Phases of the Illumination of Interiors," by Preston S. Millar, Secretary, Electrical Testing Laboratories, New York, N. Y. [A lecture demonstration, employing miniature rooms to illustrate several well-known types of lighting installations, indicating their peculiarities and good and bad features.]

"The Importance of Direction, Quality and Quantitative Distribution of Light in Illumination," by M. Luckiesh, Assistant Physicist, National Electric Lamp Association, Cleveland, O. [A lecture-demonstration chiefly by subjects taken from the fine arts.]

"Gas Lighting of Interiors," by C. A. Luther, Illuminating Engineer, Peoples Gas Light and Coke Company, Chicago, Ills. [A paper dealing with the lighting of interiors by gas, and illustrating the manner in which gas is used to obtain the results explained in Mr. Millar's demonstration.]

"Street Lighting by Gas," by F. V. Westermaier, Engineer, Welsbach Street Lighting Company of America, Philadelphia, Pa. [A paper dealing with street lighting from the standpoint of the most modern methods.]

This will evidently be an entertaining and instructive session. The date of the joint meeting will be announced later.

Special Committee of the Illuminating Engineering Society on Joint Session:

C. O. Bond, E. P. Hyde,
J. C. D. Clark, L. B. Marks,
Walton Clark, W. Cullen Morris,
J. R. Cravath, E. B. Rosa,
A. H. Elliott, C. H. Sharp,
A. C. Humphreys, W. J. Serrill, Chairman.

BRIEFLY TOLD.

Obituary Note, Kerr Murray Mitchell.—A fortnight ago we briefly chronicled the death of Mr. Kerr Murray Mitchell, who passed away, at his home in St. Joseph, Mo., the evening of the 18th prox. Kerr Murray Mitchell was born in Buffalo, N. Y., October 3d, 1854, in which city his parents (Mr. and Mrs. Alexander Mitchell, natives of Edinburgh, Scotland), had arrived only two weeks prior. Stern necessity obliged him, at the early age of 12, to engage in business, and he was indentured to a Mr. Kerr Murray (the man from whence he derived his baptismal name, and, if we mistake not, a near relative), who was then prominently known in gas works' construction in Northern New York, the Lake Section and Canada. His natural aptitude for mechanics was such that, in his 16th year, he was intrusted with the supervision of the building of the plant at Windsor, Ontario. While engaged on this work he formed an acquaintanceship with Mr. C. H. Nash, who at the time was prominently identified with the old Detroit Gas Company. On the completion of the Windsor plant (about 1873) he kept on as its Superintendent until 1878. In that year Mr. Nash had secured a franchise for the construction and operation of a gas plant in St. Joseph, Mo. On the completion of the construction, Mr. Nash retained him as General Manager, which position he held through and after the ownership of those who, through purchase acquired the property, and who subsequently organized the American Light and Traction Company, of which corporation the St. Joseph Company is now an important member. Under his careful, progressive management the Company, through going along actively with the growth and material prosperity of St. Joseph, was really from the start never looked upon by the people of that city in the light of a monopoly. It did suffer some from the attacks of clubbing capitalists, but in the main it survived all these onslaughts, even to eventually overcoming the fiercest of these, the charge of the natural gas brigade. Deceased, however, was a rare diplomat, and the nature of his counselling and conducting can best be comprehended by a scanning of the number of times it emerged serenely from many serious commercial battles. Naturally his native talent, well developed by study, observation and application, made him prominent amongst his fellow gas men. His first connection with Association work was commenced with his election to membership in the Western Gas Association, on the occasion of its twelfth annual meeting (Cincinnati, O., May, 1889), and, from the time of his connection therewith until that Association lost its individuality by merging with the American Gas Institute (1906), he having then signed the merging articles as President of the Western, his unswerving, active and valuable support was given to forwarding the objects of that body. Of course, through and by the union proceedings, he became a charter member of the Institute, and was on its roll at the time of his death. Here, too, he freely gave of his best efforts to aid the growth of the Institute, and he was a regular attendant at its sessions. Indeed, his useful work on committees of that body is matter of broad and positive record. He was one of the signers of the call that brought together, in the Midland Hotel, Kansas City, Mo., the morning of February 20th, 1906, the men who then and there organized the Natural Gas Association of America. The temporary organization was directed by deceased, the original Secretary being that clever gentleman, Mr. J. H. Dunkel, of Lawrence, Kas. The first annual meeting of the Association was held in Kansas City, June 12, 1906, under the Presidency of Mr. Mitchell. In his presidential message, Mr. Mitchell, amongst its other more vital recountings, remarked: "While we have a monopoly of this valuable commodity [natural gas], we must be as considerate of the public as if we had the greatest competition. We must bring our gas to the attention of all classes, pointing out the many conveniences and comforts derived from its use. I believe we should guard this great gift, which comes to us spontaneously, free from all impurities, and of the highest calorific value of all known gases, with the greatest care, and that its application should be confined strictly to domestic uses." This excerpt is published merely to indicate or show the cool, even-mannered way which was his inseparable; and to prove that his business temperament was marked with the belief that that business was an ever-growing performance. He retained his membership in the Association to the end. In his connection with the gas industry actively it may be noted that several inventions of merit, both in respect of manufacture and distribution, are traceable to his talent as a discoverer and applier, and notable in this respect is a washer-cooler that has wide vogue. His accurate knowledge, keen memory and broad perception caused him frequently to be called as an expert, a prominent instance in this direction being his testimony in the celebrated Missouri proceeding, which eventuated in the final upholding of the charter of the old St. Louis Gas Company. However, to continue this story along these lines would be to transgress too greatly on space; but enough has been recited or narrated of his career in the industry to amply prove the high rank which he attained in his profession. To describe him personally is indeed a difficult task, and though the writer enjoyed personal relationship with him for 25 years or more, he confesses inability to do this phase of Mr. Mitchell's career anything like justice, save to say, at the outset of recording a few of the main points in his personal history, that naturally he was a gentleman, by instinct a director of men, and by temperament of the type that attracts friends, only to have them grow friendlier with each succeeding day. He was personally active in the church work of St. Joseph, and for 25 years or more was a valued member of the First Presbyterian Church, an entrance to which beautiful structure is known as the "Mitchell door." For several years he was President of the Board of Deacons, later on an Elder, and finally succeeded to the Clerkship, the highest honor his associates could confer. He was a Director and Chairman of the Ways and Means Committee, School of the Ozarks, a noted Presbyterian educational institution located in Forsythe, Mo. He was a member of the St. Joseph School Board for 17 years, and its President for two terms, and greatly have the children of his home city benefitted through his mechanical knowledge respecting the construction and maintenance of public structures. He was, of course, active in many ways with the banking, insurance and manufacturing institutions of the city, aud, although never a politician in the ordinary sense of the term, his activities along such lines were often invoked by men whose reputation is National. He was united in marriage, May 22, 1881, to Miss Eva Shirley, and the history of their union is a beautiful exemplification of joint affection, helpfulness and happiness. Mrs. Mitchell survives him, also a son and two daughters. The son (Mr. Wylie Mitchell) has completed a full course in practical gas engineering under his father's tutelage, and was assisting him in supervising the detail of construction of the new and modern plant for the Company now being erected at Second and Atcheson streets. This task would have been the crowning glory of his professional career, but the fruition must be witnessed by other sight than his. The funeral services were held in the First Presbyterian Church, the afternoon of Sunday, April 20th, Dr. William Ray Dobbins (the Pastor) officiating. The beautiful edifice was filled to the doors, and notable in that assemblage, which included representation from every walk of St. Joseph life, were the works men over whom his sway had been that of a man rather than a master. The active pallbearers were Messrs. F. Labrunerie (Secretary of the Company and a well-loved intimate for years) and Messrs. G. A. Trenholm, Henry Krug, Jr., Wm. Woodson, Joshua Graham, P. K. Enright, B. R. D. Lacy and W. E. Stringfellow. Interment was made in Mount Mora Cemetery.

FIRST MEETING, COMMITTEE ON GAS CONGRESS, AMERICAN GAS INSTITUTE.—The first meeting of the Committee on Gas Congress was held Thursday, May 8th, 1913, in the office of the American Gas Institute, with the following members present:

W. R. Addicks, Chairman.
C. W. Hare, National Commercial Gas Association.
C. H. Nettleton, New England Association of Gas Engineers.
L. B. Marks, Illuminating Engineering Society.
Alten S. Miller, Society of Gas Lighting.
L. R. Dutton, Pennsylvania Gas Association.
O. O. Thwing, Indiana Gas Association.
Geo. G. Ramsdell, Secretary.

The meeting was called to order by the Chairman, W. R. Addicks, at 11:30 A.M., and was organized by the election of W. R. Addicks as Permanent Chairman, and Geo. G. Ramsdell as Permanent Secretary. The matter of invitations to foreign gas societies was taken up and discussed at some length, as to its form, and the means of communication. No definite action was taken and the matter was referred to a subsequent meeting. Reports were received from several Gas Associations that had accepted the invitation to appoint a delegate to represent them on the Committee, but that the delegate was to be appointed later. Upon motion, and discussion, the name of the Committee on Gas Congress, in view of the fact that invitations were to be extended abroad, was changed to the "Joint Committee on International Gas Congress." In order to bring before the Committee and the various Gas Associations an intelligent idea of the Gas Congress, a Committee on Plan and Scope was appointed, to present a report at the next meeting of the Committee, outlining the general plan of the Gas Congress, and suggesting a division of the work to be placed in the hands of sub-committees appointed for the purpose of carrying them out. The Committee on Plan and Scope was appointed, as follows: Addicks, W. R., Chairman; Clark, Walton, Hare, C. W., Jones, E. C., Marks, L. B., Miller, A. S., Nettleton, C. H., Searle, R. M., Thwing, O. O. Mr. O. O. Thwing, from the Committee on "Classification of Awards," presented a resolution of protest against the present classification, authorizing the Committee on Awards to take the matter up with the Managers of the Panama-Pacific Exposition, in an effort to have the present classification revised and enlarged. Several other matters were taken up, but action was deferred until the next meeting, which was subject to the call of the Chairman.

GEORGE G. RAMSDELL, Secretary.

OBITUARY NOTE, MR. DAVID L. DOUGLAS.—"B. R. R.," writing from Eau Claire, Wis., under date of the 19th inst., respecting the late Mr. David L. Douglas, whose death has heretofore been noted in the JOURNALt, says: "In the death, May 3d, of Mr. David L. Douglas, Eau Claire lost one of its most public spirited citizens. He would have attained his 68th year, had he lived until the 19th of August, next. Originally with the Minneapolis (Minn,) Gas Company, in 1894 he came to Eau Claire, and organized the Eau Claire Gas Light Company, of which corporation he was President at the time of his death. He was also President of the Manitowoc (Wis.) Gas Company, a corporation that virtually owes its commencing to his activity. He was prominent in Association work, especially in respect of his affiliation with the former Western Gas Association. He was a Director and a principal shareholder in the Brunett Falls Manufacturing Company, at Cornell, Wis,, and was also interested in many local enterprises in and around this section of the State. He was quite active in politics, having served as Mayor of Eau Claire for several terms, represented the Eau Claire district in the State Legislature, and was always prominent in matters pertaining to civic advancement. He was for years a warden of Christ Episcopal Church, and was prominently identified with the B. P. O. Elks, the Knights of Phythias and the Independent Order of Foresters. Physically he was of the rugged Scotch type, being large of frame and positive in demeanor; but a warmer heart or a sturdier one never actuated the physicality of any other man, for his history in Eau Claire and elsewhere is well punctuated with the marke that note a plethora of deed and work well done."

NEW YORK SECTION, "GAS MEETERS."—The Eighteenth Session of the New York Section, "Gas Meeters," met in Kalil's, at 6 P.M. on Thursday, the 15th inst. Some 50 members listened to an address by Mr. L. S. Bigelow, on the "Young Man in the Industry," and learned that all of them, no matter what their count of years, could stay in that class as long as they retained their flexibility and receptivity for new ideas. Most of the evening was spent in listening to Captain "Jack" Crawford, known as the "Poet Scout," who recited some original verses on "Gas Meeters," and entertained with stories and poems on Western life. Mr. J. P. Conroy gave notice that he had something of importance for the good of the organization to bring before the next session. The next meeting will be strictly a business gathering, new Commissioners are to be elected, and it is hoped that a large number will attend and express their views as to what "The Meeters" should be doing.

PHILADELPHIA SECTION, ILLUMINATING ENGINEERING SOCIETY, MAY MEETING.—The regular meeting of the Philadelphia Section, Illuminating Engineering Society, was held Friday evening, May 16th, 1913. The dinner preceding the meeting was served at Hanscom's restaurant, 1221 Chestnut street. About 15 members were present at the dinner. The meeting was held at the Franklin Institute, at which there were present about 60 members and guests. The minutes of the preceding meeting were read by the Secretary. Mr. Israel, Chairman of the Entertainment Committee, announced that a joint outing with the American Institute of Electrical Engineers, would be held Saturday afternoon, June 7, on the athletic grounds of the Philadelphia Electric Company. There will be a baseball game between members of the two Societies, and Dr. Franklin, of Lehigh University, will give a lecture on baseball curves. There was a large exhibition of gas and electric lamps, equipped with residential glassware. The gas exhibition was described by Mr. Samuel Synder, who stated that quite a little of the glassware could be used on either gas or electric lamps, as they had the same size fitter. Mr. Mansfield, of the Holophane Company, described the electric glassware, and said that practically all residential glassware was hand blown, for such reason being more expensive. The Chairman of the Section, Prof. Rowland, introduced Dr. Herbert E. Ives, who presented a paper giving "Some Home Experiments in Illumination from Large Light Sources." Dr. Ives stated that the paper was the result of a large number of experiments made in his own home to determine the best form of illuminant for residence lighting. The first experiment tried was with a large, oiled-silk umbrella, cover side up, which covered a central fixture; while this did not prove satisfactory it showed that the effect on light walls was preferable to dark walls. An experiment with the same umbrella, turned concave side up, made a bright spot which was hard on the eye. Quite a number of experiments were made with daylight illumination to determine the proper specification for satisfactory daylight illumination. Dr. Ives said he found that a large, low brightness, concealed source, is the specification of pleasant daylight from windows. The lighting fixture which Dr. Ives finally designed, and described as giving the best effect, is a one-sided fixture, concealing the source from people sitting in the room. The side toward the wall is open and the light is thrown on the side wall from which it is reflected. Part of the light, of course, is direct through the cretonne shade. This shade is large in diameter. Dr. Ives showed two styles of shades, one on a stand about 5 feet high, and another on a table lamp. The discussion was participated in by Prof. Hoadly, and Messrs. Bond, Ely, Lloyd, Mansfield, Dr. Tenee, and Prof. Rowland. The following points were brought out in the discussion. The system of side wall illumination does not give you the sense of fatigue that is obtained in ordinary installations. It was thought that this system would be applicable to churches, etc. It was stated that though side wall illumination shades the source without interfering with the distribution, it could be used very well for desk illumination, but the screen should be made more opaque. The second paper of the evening was presented by Mr. C. A. Peterson, on the "Design of Combination Fixtures." Mr. Peterson showed quite a number of lantern slides illustrative of various types of combination fixtures, and of buildings in which they could be used. A new type of gas lamp manufactured by the Welsbach Company was shown by Mr. Peterson. This lamps looks exactly like the electric lamp used in the same fixture, and a high efficiency is claimed for it. It is furnished with or without a pilot. The meeting adjourned at 10:30 P.M.

CURRENT MENTION—

THE New York Public Service Commissioners, Metropolitan District, have approved the application of the Consolidated Gas Company for the right to acquire the common and preferred shares of the New York and Queens County Gas Company, and of the New York and Queens Electric Light and Power Company, Flushing, N. Y. The vote was 3 to 2, Commissioners Maltbie and Eustis being in the negative. Commissioner Maltbie, in a direct explanation of his vote, said he saw no objection to the acquiring of the gas shares, but did oppose the electric share purchase on the ground that competition between suppliers of gas and electric currents should be fostered.

THE proprietors of the Montreal (Canada) Light, Heat and Power Company have planned busy times for the men in control (Mr. Howard E. Mann and associates) of the gas department of this huge corporation. The new plant, the location of which has heretofore been mentioned in the JOURNAL, together with some other general details concerning it, is now in course of construction, and the Company is determined that it shall be in active operation in the fall of 1914. Some of the contracts recently awarded in this connection (and these eloquently tell of the magnitude of the work) are: To the West's Gas Improvement Company, of Manchester, England, a 4 million cubic feet per day retort house, covering 14 benches of the contracting firm's continuous vertical retort system. The Company, too, has planned for the placing (in 1916) of an additional 4 million unit. To the Bartlett-Hayward Company has been awarded a contract for the construction of a storage holder up to retaining 6 millions cubic feet, the vessel to rest in a steel tank. And the Mead-Morrison Manufacturing Company, of Boston, Mass., will erect a coal unloading plant, capable of delivering 300 long tons per hour, the equipment to include a suitable cable railway system. The Mead-Morrison contract calls for the construction of an inclosed shed up to the safe and convenient storing of 180,000 tons. The remaining apparatus, etc., will be all contracted for this summer. Seemingly these huge items are deemed insufficient to keep the gas forces busy this summer, for the Company has also contracted with the Parker-Russell Mining and Manufacturing Company, of St. Louis, for this additional coal gas equipment at the old plant: Nine benches of eights, 20 foot through, horizontal. On the completion of this huge addition to the Company, the old (though new) generating system will consist of an installation of 27 benches of eights, and 9 benches of elevens, all 20-foot throughs. Which means an altogether different state of working from that witnessed when, say 4 years ago, the Canadian Gas Association visited the Montreal works, the rehabilitation of which had been then turned over to the intelligent direction of Mr. Mann and his associates.

(*Continued from page* 339.)

gas tar, and 1 specifies a water gas product. An average of these specifications (omitting specifications for oil for treating paving blocks) shows that the average distillation limits are 7.2 per cent. at 210°, and 33.7 per cent. at 235°. There is not one specification in the lot that would permit the use of the average oil made by including the entire fraction from light oil to soft pitch, and very few that would pass the average oil made in running hard pitch. This means that in distilling tar a fraction known as "middle oil" has to be separated. The size of this fraction is determined by knowledge of the tar used, and the creosote specifications to be met.

The "middle oil" fraction is usually high in tar acids (crude cresylic and higher phenoloid bodies) and naphthaline. This oil, without subsequent or final treatment, has very little value, and must either be sold for creosoting at a very low price or else burned. Modern practice includes the removal of the tar acids by a process which consists of agitation with caustic soda, gravity separation of the extracted oil and "sodium carbolate;" with liberation of the "acids" by passing carbon dioxide through the material. The neutral oil, from which the acids have been extracted, is often treated for removal of naphthaline. The naphthaline goes to the plant where refined products are made, and a market can sometimes be found for the residual oil when thus freed from crystals.

I have stated that the distillation is continued until the residue has the proper consistency. Of late the residual pitch products have to meet more or less stringent specifications, just as the creosote oil does. Taking the more common residual products in the order of hardness, we have first refined tar or soft pitch for saturating roofing felt. This tarred felt is one of the principal products of the tar industry. The manufacture of tarred roofing felt or "tarred paper," as it is sometimes called, is essentially a simple process. The "dry" felt for saturation is put up in large rolls, and during the process of saturation the roll is unwound, and the sheet of paper passed rapidly through a tank containing tar, heated by steam coils or jackets. The saturated felt, as it comes from the bath, is passed through squeeze rolls to remove the surplus, and is then wound directly on spindles. I find very few tars from which, by themselves, a good saturating material can be produced. It is generally necessary to combine two or more tars to secure the most desirable product.

Refined tar for road surfacing varies from a thin product, that can be applied cold, to a pitch having a melting point of over 100° F. In the production of road tars the distiller has again to meet innumerable specifications, some of which are reasonable, and often the manufacturer is consulted in regard to what he can furnish. There exists considerable difference of opinion as to the characteristics desired for road work. Taking the free carbon content, we have to meet specifications all the way from one requiring that it shall not exceed 10 per cent., to some requiring that it shall be between 30 and 35 per cent. A standard test for creosote oil has been almost universally adopted, but there are many different methods of testing road tars, and too often the specifications do not clearly indicate the method to be followed. In a recent instance, a specification required a distillation test within definite limits of temperature, and it was found that a material could not possibly be produced that would meet the requirement. After a conference we found that the whole thing hinged on the location of the thermometer in the distilling vessel. We hope that the American Society for Testing Materials will eventually succeed in preparing standard methods for testing road materials. At present, manufacturers of bituminous road materials, often find it difficult to meet the specification adopted by cities or States, and at the same time produce materials that meet their own ideas as to quality. There is, perhaps, no other industrial application of bitumens in which it is so easy for the material to get a "black eye" as in road work. A road is constructed, using as a binder a material for which the specification may not have been approved by the manufacturer. Later on, if the road fails, the binder is usually blamed. If it is a tar binder, it makes no difference what kind of tar it was, all tar binders will receive a setback in that locality. Producers of tar can do the industry a great deal of harm by allowing tar to be used indiscriminately in road construction.

More pitch is used for roofing and waterproofing than for any other one purpose. A very high standard has been set for "straight run coal tar pitch" for built-up roofs, and the success of this type of roofing can justly be credited to the tar distillers. Until very recently there has been practically no attempt, outside of the laboratories of the refineries, to determine the characteristics of good pitch. Recently, the subject has been investigated by the Bureau of Standards of the United States Government; by the Building Committee of the American Railway Engineering Association; by the Underwriters' Laboratories, and others. In all of these investigations there has been freely afforded an opportunity for manufacturers to cooperate. In the production of roofing pitch, as in the production of saturating material for tarred felt, it is necessary to select tars with great care. The production of hard pitch has been relatively much less in the United States than in Europe, because for many years the industry of fuel briquetting has flourished there, and has formed the principal market for pitch. A larger market for hard pitch in this country is being sought, and new uses have been developed, although coal briquetting progresses but slowly. For the production of hard pitch the average gas works tar contains more free carbon than is desirable, both from the standpoint of wear on the stills and quality of the product. A moderately high percent. of free carbon is derived in soft pitches, but not usually in pitches harder than roofing grade.

There are many other interesting products and specialties, which could be mentioned if time permitted.

In conclusion, I suppose some attempt should be made to answer the question that must be uppermost in your minds—what should the gas works do with its own tar? However, I will not attempt to answer this question. Mr. Whitaker has given you a description of an attempt on the part of his company to work up its own products. I can only urge that if doing your work for the general good of the industry, do not attempt to sell products that are not really suitable for the particular purpose. A chaotic condition would surely result if there were not large refiners of tar, independent of the gas works, who are willing and able to absorb the tar from the various sections of the country whenever a large, new supply is developed. Therefore, to some extent, those of you who engage in tar distillation would seem to be under obligations to the large distillers.

Special English Correspondence.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, May 10, 1913.

Retirement of Mr. James W. Helps.—Protection of Main Pipes During Tunnelling Operations.—More Vertical Retorts.—Concerning the Gas Fire.

The retirement of Mr. James W. Helps from the position of Engineer and Manager to the Croydon Gas Company, after 25 years service, is an event of much more than ordinary local significance. Mr. Helps has presented such a happy combination of technical and commercial ability—two attributes that do not always run together—that the loss of his services at the head of affairs will be a serious one to the Croydon undertaking, notwithstanding the fact that well trained and experienced assistants are quite able to take up the work in a competent way. No doubt some arrangements will be made whereby the benefit of his experience and skill will be available. During his time, the undertaking has been extended by the acquisition of two neighboring gas companies, Carshalton and Caterham, and is now responsible for the supply of an important suburban area covering some 78 square miles in extent. The whole of the plant has been reconstructed on modern lines, from time to time, as increased requirements rendered such necessary. But this is not the place or time to refer so fully to his work at Croydon, as to his services to the industry at large. It is not too much to say that, during the whole period of his connection with the gas industry, he has been in evidence as a pioneer in the cause of progress. During the last 30 years the industry has advanced in every direction, technical, financial and commercial, and as the Honorary Secretary for many years of the Southern District Association of Gas Engineers, and at a later period of the Institution of Gas Engineers, Mr. Helps has been associated with every step forward. At both of these Societies, his labors were recognized by election to the Presidential chair, and his year of office was no less marked by benefit to the Association than by personal credit to himself. As President of the Institution of Gas Engineers he was largely concerned in the initiation of the British Commercial Gas Association, the vitality of which has been such a surprise to those who believed, or were anxious to believe, that the gas industry had passed into that stage of easy going senility that is an indication of an early dissolution. Those who are waiting to give it a decent burial are likely to have their patience sorely tried—thanks to such energetic workers as Mr. James W. Helps. In addition to his extensive capabilities, a pleasing personality will cause

his retirement to be a matter of regret to a very large circle of professional friends.

In connection with a scheme for enlarging railway tunnels, the position of the owners of gas and water mains, in connection with excavation or underpinning carried on at a level below or beneath them, recently came before a select Committee of the House of Lords, and it is rather surprising that the interests of the public in this matter did not appear to receive much consideration. The failure of a gas or water main of large dimensions is of far wider importance than the cost of repair or replacement. There is the inconvenience and risk of danger caused by the partial or entire stoppage of supply, and by the liberation and escape of large volumes of water or gas. The City and South London Railway Bill included the enlargement of long lines of tunnel in the metropolis. Petitions were presented by the Metropolitan Water Board, the Gas Light and Coke Company and the South Metropolitan Gas Company, praying for the right to take joint proceedings before an arbitrator in the event of damage to pipes, and that the work of enlargement should be carried out one at a time, in order to mininize the risk of subsidence due to the necessary pumping operations. The Committee refused to sanction anything in the way of special protection, being apparently of opinion that the general clauses protecting property owners were sufficient. One might reasonably suppose that property, concerned in the convenience and safety of large districts, stood on a somewhat different footing, to property of value to no one beyond the owner or tenant, and that the question represented not so much the interests of the Water Board or of the gas companies as private owners, as the necessity in the public interest for an uninterrupted supply of gas and water. The Lords Committee, however, appear to have thought differently.

Amongst the latest additions to vertical retort working may be mentioned two, as serving to show that the system can be successfully applied either on a large or small scale. The Bournemouth Gas and Water Company have erected at their Poole works, six settings of Woodall-Duckham verticals retorts each setting comprising four chamber retorts. Each retort will carbonize 5 tons of coal per 24 hours, so the total capacity is 120 tons, or say 1¼ million cubic feet per day. The house containing the installation is a braced steel building covered with concrete. The storage hoppers will contain 24 hours' supply, and are situated in the roof, being supported by the building frame independently of the settings, and are fed from an existing Temperley transporter, by means of a bucket conveyor traversing the center line of the house. A similar conveyor takes the coke from the bottom of the retorts to the storage hoppers. This arrangement gives absolute cleanliness in all parts, by avoidance of escaping smoke, soot or flame, free light and access, and admits of considerable latitude in the matter of constructive detail, both as regards charging and discharging apparatus. The plant is working Durham and Yorkshire coal, and is controlled by 3 men per shift, one on the top of the settings to attend to the hoppers, gas outlet pipes, etc., one in charge of the conveying machinery and one to look after the coke discharge. The mechanical power required is only 8-horse power for the conveyors and 1-horse power for the coke discharge. There are no tar troubles or choked pipes, and the coke is of excellent quality, dry, good silver grey, appearance, and sells well. The working has proved so satisfactory that a further installation, of double the present capacity, has been put in hand. When completed there will be a total productive power of 4 million cubic feet per day. So much for the large scale. At Lurgan the results have been published of a year's working with a Glover-West installation of two beds of four retorts each, so arranged that any one retort can be put out of use at will. The arrangement has proved quite equal to the vicissitudes of a small but variable demand; 3,958 tons of coal have been carbonized, giving a yield of just over 47 million cubic feet of gas, or nearly 12,000 cubic feet per ton, the illuminating power being 16 candles. The coke available for sale per ton is 9 cwt., and although wages rates have been advanced over 20 per cent., the carbonizing wages per ton of coal are 60 per cent., as compared with the cost of working horizontal retorts. In this case also no difficulties in working have arisen, but whereas in the past there has been much trouble with naphthaline not only on the works, but in the district, this trouble has entirely disappeared.

Gas fires have been very much in evidence of late. The steady improvement in construction, continued over many years, has led to the production of a really good article at a very moderate price. The indiscriminate fixing of these appliances by ironmongers and plumbers having no knowledge of economical combustion or of effective ventilation, has led to undeserved condemnation in many cases, the ignorance of the workman being blamed on the appliance. The great difficulty is that gas heating and cooking appliances do not enter into the schemes of the average architect or builer, so that it is only in exceptional cases that appropriate accommodation is provided for them. The ordinary flues as constructed for coal fires, having an area that leaves a substantial margin for accumulations of soot, are some four or five times too large, with the result that when a gas appliance is connected to them they tend to act as cooling and condensing chambers rather than as flues. The flue for a gas fire or gas cooker should not exceed 18 to 24 square inches in sectional area, and should be either covered with non conducting material, or constructed of such. With this provision there will be no complaint about the stuffiness of gas fires or of smells from the cooker. The continued experience in construction of gas burners enables one to ensure complete combustion, and this enables gas appliances to be used in localities where the ventilation is by no means perfect, without nuisance or ill effects. It has been observed, and can readily be demonstrated by figures, that if a room or apartment is so defective in the matter of ventilation that gas cannot be burned in it without causing unpleasant sensations, it cannot be fit for wholesome occupying in the absence of gas. And it must not be forgotten that the great advantage of gas, either for cooking or warming, is the nicety with which the heat can be adjusted, and the fact that it can be maintained at any point of the thermometer for 1 or 100 hours. If we want to maintain a sick room at an even temperature of 60°, it is a simple matter to do so by the aid of a gas fire, but even with the most skilled and careful attention the coal fire will fluctuate. When fresh fuel is put on there is little or no radiant heat for several minutes until the new supply becomes thoroughly ignited. After a time the maximu m effect is reached and the whole body of fuel becomes incandescent, and from this point there is a falling off due to the gradual reduction of the fuel to ash. No doubt it is observation of these facts that has led continental matrons to condemn the open fire as inefficient and wasteful. In practice, when the nurse or other attendant receives orders that an apartment must be kept at 60°, that figure is regarded as the lowest limit, and with the coal fire the actual temperature will be anything between 60° and 70°, according to the period of last firing up as above indicated.

It is interesting to find that a German writer, Herr Körting. (a name well known in connection with gas matters) while considering whether the modern gasfire can be applied with advantage to the average German habitation, has something to say in favor of the English open fire. While there is a great tendency in Germany to make fun of the open fire as being retrograde, barbaric, roasting in front, freezing behind, there could not be a greater mistake. He claims that England has taken the lead in water supply, gas supply, and in all the arrangements that make life pleasant for well-to-do people, and that she should favor retrograde and barabric methods of heating is not probable, and is based on misconception. It would be nearer the mark to regard the open fire as the best system. The Englishman likes perfectly pure air, and a prodigious amount of ventilation. Heated air, with convected heavy, bad smells is an abomination, and so the open fire with its radiant heat, and powerful ventilation, is what he wants. And the modern gas fire with its high efficiency and with a cheap gas, is largely used in offices, libraries, and other apartments subject to intermittent occupation. The German idea is to encourage heat at the expense of ventilation, and something more than the central heating system generally used in the poorer tenements is wanted. It appears that until recently the form of gas fire known as "incandescent," in which the flame from upright Bunsen burners is caused to play upon incombustible radiant material, was not used in Germany. Any open stoves used were of the reflector type. But the advantages of the incandescent fire are now attracting attention and a large number have been fitted in Berlin, with satisfactory results. The best patterns get rid of the products of combustion by way of the chimney without an intervening flue pipe, but if necessary a connection is made to the nearest open chimney with 4-inch flue pipe, and there need not be the slightest escape of products of combustion in the room.

THE Indianapolis (Ind.) Gas Company has arranged for an extensive addition to its main system this season. This great business center of the Hoosier State is growing in population and wealth with really wonderful strides, and it may be truthfully said that the people in charge of the artificial lighting interests have been of great assistance in forwarding the growth here commented upon.

Correspondence.

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

Mr. Egner Quotes the Vallon Paper in Regard to a Naphthaline Question by Mr. J W. Ott.

WASHINGTON, D. C., May 17, 1913.

To the Editors AMERICAN GAS LIGHT JOURNAL: In the JOURNAL for April 21, 1913, I find some questions put at the recent meeting of the Indiana Gas Association, concerning which I can give the questioner, and perhaps others interested, some light with your kind permission. At the Twenty-sixth Annual Meeting of the British Gas Institute, held on June 19th, etc., 1889, a paper was read by Mr. W. A. Vallon, Assoc. M. Inst. C.E., on "Experience in the Manufacture of Oxygen on Gas Works and the result of Its Practical Application to the Purification of Coal Gas."[1] The paper, which was reprinted in pamphlet form, contained 29 pages of very interesting matter. It gave: 1.—An historical summary of the development of the progress made to June, 1888. 2.—A summary of the development of this progress in its application to everyday requirements. 3.—The result of the application in actual practice. 4.—The advantage accruing from the use of oxygen in the purification of coal gas, from a commercial, practical and scientific standpoint.

Mr. Valon was then at Ramsgate, where the process was in operation. I also saw it, although not until 1897, elsewhere in England; but long before that year, and while still Engineer of the Laclede Gas Light Company, of St. Louis, Mo., was seriously thinking of testing the process there, as it seemed worth while. Indeed, only subsequent changes in ownership and management of the property named prevented this being done.

In one part of his paper Mr. Valon stated that, by adding 0.6 per cent. of oxygen to the gas (coal gas) its illuminating power was increased 2½ candles, besides the manifest advantages as an aid to purification.

As to the naphthaline preventative desired by Mr. J. W. Ott, I can indorse the plan recommended by Mr. Thwing, for that method was introduced by the writer at the Howard street works of the Laclede Company in the fall of 1883, and it always gave satisfaction. It will be found, if memory serves me rightly, illustrated in the Volume of "All American Gas Wrinkles," published at the instance of the Western Gas Association, under the editorship of Mr. Wm. E. Steinwedell, Cleveland, O. It was also shown in one of the Wrinkle Volumes of the Ohio Gas Association, but I do not recall offhand the particular edition. Trusting this information may be acceptable to my old friends of the AMERICAN GAS LIGHT JOURNAL, I remain,

Yours sincerely, FREDERIC EGNER.

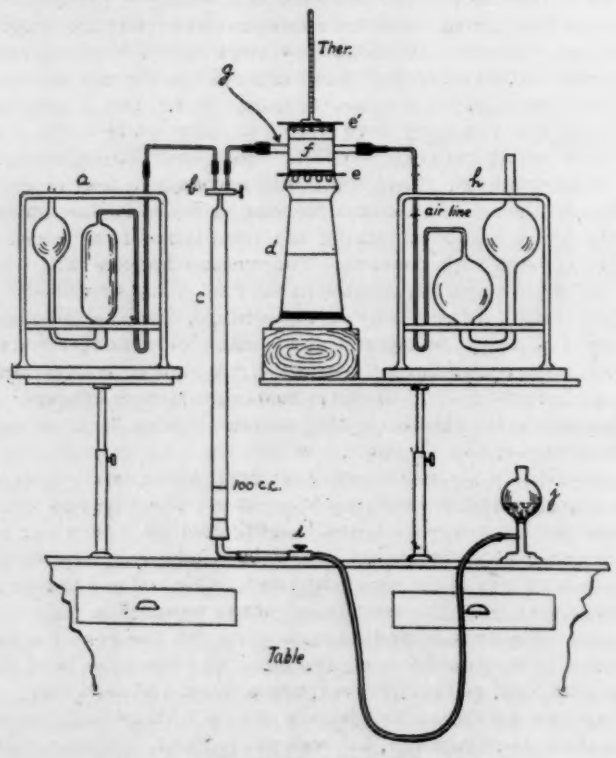
New Methods and Appliances.

A MODIFICATION OF THE JAGER METHOD OF GAS ANALYSIS.[2]—By S. H. WORRELL.—In gas analysis, the absorption of carbon dioxide with KOH, is a simple matter. The same is true with reference to the determination of the illuminants (unsaturated compounds) with bromine water, and oxygen with stick phosphorus. However, the absorption of CO with cuprous chloride, and hydrogen with palladium tube is sometimes less successful. The absorptions of hydrogen with the palladium tube were never very satisfactory in the work in this laboratory, and burning both the hydrogen and methane together was resorted to for awhile; the loss in volume being hydrogen which when burned condenses to water. But this method is open to the objection that there is no check on the carbon monoxide absorption with cuprous chloride; for, the CO present, if any, is burned to carbon dioxide and is absorbed and measured along with that due to methane. Furthermore, if there is any ethane present, it increases the residue in volume when burned and thus decreases the apparent percentage of hydrogen. However, with Jäger's method, the hydrogen is first removed. Then when the residue from the hydrogen is burned, the increase if any in volume is due to ethane. In this way the ethane can readily be determined. Of course, no distinction is made in this case between ethane and any higher member of the series, which if present would be measured as ethane.

In using Jäger's method, a pipette containing water slightly acid with sulphuric acid, was always used instead of KOH as he directs. It was soon observed that the residue left after burning out the hydrogen at 250° C., frequently contained a small quantity of carbon dioxide. At first it was thought that this small quantity of CO_2 was due to a partial combustion of methane, caused perhaps by its reacting with a small quantity of copper oxide dust that might be present. However, prolonged heating at 250° C., and repeatedly passing the gas did not cause the formation of more carbon dioxide. As a matter of fact, this carbon dioxide when present was due to the burning of the small residue of carbon monoxide which had failed of absorption with the cuprous chloride, either through lack of thorough shaking or too weak a solution.

As a result of this observation, the cuprous chloride pipette has been discarded entirely, and after removing the oxygen with stick phosphorus, the procedure is simply to burn the hydrogen to water and the total of the carbon monoxide to carbon dioxide in one operation at a temperature of 250°. The loss in volume is the percentage of hydrogen present. The CO_2 formed is then absorbed by KOH and the loss in volume is the carbon monoxide that was present. The copper oxide is then heated to redness and the residual gas passed. The volume of gas is noted before and after burning. If there is an increase in volume it is due to ethane, and one-half this increase is the percentage of ethane present. The total carbon dioxide formed is then absorbed and the residue noted. The loss in volume, accounting for the ethane first, is the percentage of methane present. The residue is the percentage of nitrogen direct.

For the method in detail, reference is made to the accompanying illustration. All glass connections are of capillary tubing and the rubber should be thick-walled, tight-fitting.



Apparatus for Gas Analysis.

a. Semi-permanently attached KOH pipette (500 gms. to the liter).
b. Two-way stopcock.
c. Gas burette.
d. Craddock burner.
e. Asbestos board, $\frac{1}{16}$ inch thickness, solid.
e'. Asbestos board, with a hole for a thermometer.
f. A 4-inch asbestos air bath.
g. Silica tube, ¼ inch bore, 7-inch long.
h. Pipette filled with water, slightly acid with sulphuric acid.
i. One-way stopcock.
j. Leveling bulb filled with 1 per cent. to 2 per cent. sulphuric acid.

The solution of KOH in *a* having previously been drawn over *nearly* to *b*, the stopcock is closed to *a* and opened to the air. Before the portion of the apparatus shown from *d* to *h* is placed in position, the burette is filled with gas to be analyzed until the water sinks about 1 inch below the 100 cc. mark. The stopcock *b* is then closed and the leveling bulb *j* raised until the gas under pressure has a volume of 100 cc. The stopcock *i* is then closed and *b* opened, bringing the gas to atmospheric pressure and exactly 100 cc. The gas is then passed into *a*, where its carbon dioxide is removed. The water

1. See JOURNAL, Vol. 51; July 22, 1889; p. 103.
2. "Metallurgical and Chemical Engineering."

in the burette is now caused to flow out to the air until the entire system including the connection of capillary tubing is filled with water. The bromine pipette containing water saturated with bromine, to which a few crystals of KBr have been added, is then attached on the right. The gas, returned from *a* to *c*, and back and forth a few times if necessary, is measured by bringing the liquid in the leveling bulb *j* to a level with the water in the burette. Stopcock *i* is closed and the burette is read. The loss in volume is the percentage of carbon dioxide present.

The gas is then passed back and forth from *c* to the bromine pipette until bromine fumes are distinctly visible in the gas on returning to *c*. It is then passed into *a* to remove these fumes and upon being brought back to *c* is measured. The loss in volume is the percentage of "illuminants" (unsaturated carbon compounds) that were present.

The phosphorus bulb is then substituted for the bromine bulb and the oxygen determined by loss in volume.

The apparatus as shown in the illustration is then placed in position. Care must be taken to have the right hand opening of the two-way stopcock *b* and the capillary tubing leading from it, entirely free of KOH solution. In fact, *no one drop of KOH must enter the burette* if it is possible to avoid it, for the reason that one drop can absorb many times its volume of CO_2, causing an error in the hydrogen determination. If any KOH has entered, the gas should be passed into *a* after the oxygen is determined, and the passageway to the air thoroughly washed with the acid solution in *c* and *j* until all KOH is removed or neutralized.

The apparatus having been placed in position as shown, the air line on the capillary tube of *h* is noted, With a little care it can always be brought to the same place. The burner is then lighted and turned down until the bottom of the board *e* glows in one spot in the center from 1 to 2 inches in width. This will generally be found sufficient to bring the air in the bath to 250° C. which is the required temperature. The silica tube, is filled in its central portion, about 4 inches, with copper oxide, "wire form," crushed until it will pass a 20-mesh screen, and none passing 80-mesh should be placed in the tube since it clogs the passage of the gas. The remainder of the tube is filled with an asbestos fibre plug, about ¼-inch on each side of the oxide, and then glass wool to each end. The glass wool is not necessary, except to make the air content smaller, and to retard the passage of water if any should by accident enter the tube. Care should be taken *not to pack* the copper oxide or it will expand on heating and crack the tube. On the other hand it should fill the tube entirely to avoid an empty passage along the top.

The temperature of the air bath being from 250° to 260° C. as shown by the thermometer, the leveling bulb *j* is placed on a shelf above the level of *f* and the cock *i* opened slightly to allow the gas to pass *slowly* through *g*. It must be passed back and forth until it no longer loses in volume (about 6 to 8 times). The light being extinguished, and e^1 being removed, the apparatus soon cools to the temperature of the room. Then the gas is returned entirely to *c*, until the water rises in the capillary tube of *h* to the *former air line*. The cock is then closed and the loss in volume noted. This loss in volume is the hydrogen present in the gas plus the oxygen of the air in the silica tube. All this oxygen has been used up, of course. This volume of oxygen has to be subtracted from the loss in volume due to the hydrogen burning, and the difference is the percentage of hydrogen in the gas. (A simple way of determining the air volume of the silica tube or rather of its oxygen content will be given further on.) The residual gas is then passed into bulb *a* and the carbon dioxide formed by the combustion of the CO while heating to 250° is measured directly by absorption. To accomplish this thoroughly, the residue in *c*, after being deprived of its CO_2 content, is again passed through the silica tube, which, of course, contains CO_2, and then the whole is again passed into *a*. By repeating this fractional removal 3 or 4 times, the CO, is reduced to an amount too small to be measured.

The asbestos board *e* is now removed, the burner again lighted and the tube heated to redness. The gas should be passed back and forth as in the case of the hydrogen, but in this case can be passed much faster. The light is extinguished, the apparatus allowed to cool and the volume noted. It should be the same as before burning, or at least no less. If less, it shows that the hydrogen and possibly the CO were not completely burned, or that KOH was allowed to enter the burette and up into the capillary tube leading to the silica tube. Any increase in volume is due to ethane or a higher member of the series. This increase in volume, if due to ethane alone, may be read at once as the percentage of ethane. The gas is again passed into *a*, the CO_2 removed and the residue measured. The loss in volume is the percentage of methane if there was no ethane. If ethane was present, the percentage of ethane is doubled and subtracted from the total amount of carbon dioxide formed. For example, suppose a mixture of the following gases in the residue: 8cc. of nitrogen, 20cc. of methane and 7cc. ethane, with a total volume of 35cc. Upon burning, the nitrogen, of course, is unaffected; the methane burns to CO_2, but has the same volume as before, but ethane doubles its volume on burning. The total volume will be 42cc.; 42-35 gives 7, the percentage of methane. When passed into KOH, the loss in volume will be 34cc.: 34 less 14 (double the percentage of ethane) gives 20, the percentage of methane. In removing the carbon dioxide, the same fractional method has to be resorted to as in the case of the carbon monoxide determination mentioned above. The sum of the various constituents determined thus far, is subtracted from 100 and the residne is nitrogen; or, the residue after removing the last of the carbon dioxide is the nitrogen percentage when when the oxygen content of the silica tube has been added to it.

To "standardize" the silica tube and all that portion of the apparatus between *b* and the air line in *h*, the following procedure will be found convenient: Take any gas, such as average city water gas or coal gas, known to contain methane to the extent of say 5 per cent., but no ethane (no sample of gas has been analyzed in this laboratory in the past year that contained more than a "trace" of ethane), and remove the carbon monoxide and hydrogen by prolonged heating at 250° as outlined above. The residue of methane and nitrogen is passed into *a*. The bulb *h* is removed, the burner again lighted, and the cuprous oxide and copper are again oxidized to black oxide of copper by repeatedly passing air in and out. The apparatus is then allowed to cool, and air is once more passed in and out to be sure that the silica tube contains air only. The bulb *h* is then attached as before and the residue of methane and nitrogen burned as outlined above, by passing the gas back and forth 2 to 4 times. It is then allowed to cool, returned to the burette and the loss in volume carefully noted. The loss in volume is that due to the oxygen of the air content of the silica tube and accessories in place. This then is the amount to be deducted from the hydrogen percentage and added to the residual nitrogen to determine the percentage of nitrogen. The copper oxide in the silica tube can be reoxidized and used over and over again by passing air as just described.

Following are results obtained in a number of analyses by this method alone, and when combined with the cuprous chloride method.

Gas No. 1.

1st Sample.		2d Sample.	
CO removed with CuCl.....	4.6	CO removed with CuO only..	14.0
CO removed with CuO.....	9.6		
	14.2		

Gas No. 2.

1st Sample.		2d Sample.	
CO removed with CuCl.	11.2	CO removed with CuO only..	21.9
CO removed with CuO	10.6		
	21.8		

Gas No. 3.

1st Sample.		2d Sample.	
All CO removed by CuO ...	16.8	All CO removed by CuO.....	17.0

Gas No. 4.

1st Sample.		2d Sample.	
All CO removed by CuO....	15.5	All Co removed by CuCl.....	15.0

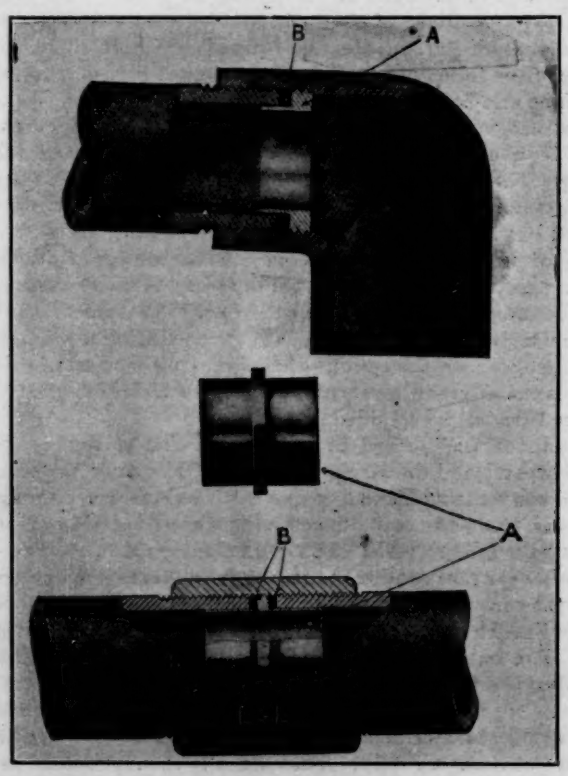
Gas No. 5.

1st Sample.		2d Sample.
Carbon dioxide.....	0.2	0.2
Illuminants.....	2.0	2.0
Oxygen.....	1.4	1.3
Hydrogen	45.1	45.1
Carbon monoxide.....	19.3	19.4
Methane.....	24.4	24.6
Residue.....	7.6	7.4

In conclusion, attention may be called to the fact that in the Jäger method as outlined in the reference, if the CO was not completely removed it would place an error on the hydrogen due to the use of a KOH pipette where bulb *j* is placed in the accompanying illustration.

It may be that the determination of carbon monoxide by this method has already been used. After repeatedly experimenting with this method for the past 2 years, the writer has a decided preference for the method as outlined above as compared with the cuprous chloride, palladium oxide and explosion method, from the standpoint of both accuracy and convenience.

A New Pipe Joint.—In some English high pressure installations they are using the Barrett pipe joint, shown in the cut. It is essentially a brass or iron sleeve *A*, with a washer *B*, of lead or other material, the washer being compressed by screwing the pipe down upon it.



Rapid Growth of Cement Industry.—As a barrel of Portland cement will consume about 450 pounds of limestone and 150 pounds of clay or shale, a plant making 1,000 barrels a day will use, in the course of a year, about 66,000 tons of limestone and 22,000 tons of clay or shale. Assuming average density for these materials, a 1,000-barrel plant will use up almost 1,000,000 cubic feet of limestone a year, together with 250,000 cubic feet of shale. As the investment in plant is heavy, it would be folly to locate a cement plant, under ordinary circumstances, at a point where less than 20 years' supply of raw material is in sight. A thousand-barrel plant, therefore, should have 20,000,000 cubic feet of limestone and 5,000,000 cubic feet of clay or shale on its properties. The recent growth of the American cement industry has been so rapid that its present relative standing among our great industries is realized by few, even of those directly interested. Its importance, both commercially and financially, is perhaps best brought out by comparison with the American iron industry, whose standing is everywhere fully understood. The following table, compiled by E. C. Eckel of the United States Geological Survey, gives the output of pig iron and Portland cement in long tons during every fifth year from 1880 to 1910, inclusive.

Year.	Pig Iron, Long Tons.	Portland Cement Long Tons.	Percentage of Cement to Pig Iron.
1880	7,749,233	7,000	0.1
1885	7,415,469	25,000	0.3
1890	9,202,703	56,000	0.6
1895	9,446,308	165,000	1.7
1900	13,789,242	1,414,000	10.3
1905	22,992,380	5,874,469	24 3
1910	26,674,124	12,986,152	48 7

Publications.

[All Publications, Catalogues, etc., mentioned below, are kept in our office for the convenience of our patrons.]

"*Peck Carrier Book*," 120.—Issued by the Link-Belt Company, comprises 110 illustrated pages describing its carrier for coal, coke, sand, stone, ore and other heavy materials.

The M. T. Davidson Co. has issued a very comprehensive catalogue, that describes fully its pumps and pumping engines, condensers, evaporators, ash ejectors, etc.

Bristol Company.—Bulletins Nos. 143 and 173 describe its recording differential pressure gauges and recording flow-rate meters. Bulletin No. 170 is devoted to its electric furnaces, while No. 1,300 deals with Class 3, recording thermometers. These publications are new, and the apparatus is well described. Particular attention is called to Bulletin No. 1,300.

Items of Interest
FROM VARIOUS LOCALITIES.

"L. M. S." is informed that, at a called meeting of the Directors of the Cincinnati Gas and Electric Company, Mr. Norman G. Kennan was succeeded in the dual office of Secretary and Treasurer by Mr. J. B. Foraker, Jr.

The proprietors of the Decatur (Ills.) Railway and Light Company have purchased an additional plot adjoining the present works, and will erect thereon buildings sufficient to house six benches of 6's, with inclined silica retorts and settings, a radial brick chimney, coal and coke handling machinery, scrubber, ammonia concentrator and gas connections. The contract for this work has been placed with the Gas Machinery Company, of Cleveland, O. The Gas Machinery folks virtually rebuilt the Decatur plant some years ago.

"V. M. A.," writing from Cleveland, O., under date of the 17th inst., forwards the following: The wages' rates of the 700 employees in the heating, lighting and railway division of the Toledo (O.) Railways and Light Company were officially increased, by order of President F. R. Coates, with the sanction of the operator (H. L. Doherty & Co.), issued last Tuesday. The revised schedule of pay rates calls for an increased expenditure of $40,000 per annum in the named divisions. The average rate of increase is 10 per cent. per employee, and is applicable to an adjustment from the Doherty merit system, according to years of service rendered. The increase is dated as of May 1st.

The total gross revenues of the Brooklyn (N. Y.) Union Gas Company, for the 12 months ending December 31, 1912, are returned at $9,934,602, or a gain over the previous year of $466,672. The outputs, for the same relative period, were: 13,063,925,000 cubic feet as against 12,436,850,000 cubic feet.

Mr. W. G. Rockefeller has been chosen a Director in the New York Mutual Gas Light Company, vice the late Mr. C. S. Palmer, Mr. Donald G. Geddes was chosen to fill the vacancy on the Board occasioned by the resignation of Mr. George Zabriskie.

At the annual meeting of the Carlisle (Pa.) Gas and Water Co., these officers were chosen: President, Mr. John Hays; Managers, Mr. M. Henderson, Jr., Anne A. Hays, Dr. H. M. Boyer, J. E. Einstein, W. H. Newsham, Geo. W. Hays, L. R. Breneman and R. S. Hays.

Paul M. Wade, writing from Springfield, Mass., under date of the 16th inst., incloses this: "The authorities of Mount Holyoke College have contracted with the Springfield Gas Light Company for a supply of illuminating gas for a period of 3 years, the minimum annual supply to be 4,000,000 cubic feet. The South Hadley Selectmen sanctioned an amendment to the Company's franchise under which this contract was made possible, the contract making necessary the running of a main 12 miles in length. The contract is to run for 3 years, and the necessary pipe work in the premises is now underway. The College people have at last found out that manufacturing gas on their own account, by the agency of an oil gas system, is altogether too expensive.

The Messrs. James M. and H. P. Kirkpatrick have incorporated the Utica (O.) Gas and Electric Company. It is capitalized in $30,000. This place is a port village of Licking county, O., on t he North Fork of the Licking River, located at a point on the Baltimore and Ohio Railroad, 13 miles south of Mount Vernon. The main business of the place is glass manufacture, and its population (not in excess of 2,000), does not seem large enough in numbers to support a gas enterprise.

The Manhattan Gas Company, the projectors of which were recently granted a franchise to construct and operate a gas works in Abilene, Kas., which franchise was subsequently ratified by the vote of the taxpayers (588 for and 50 against), will commence construction work forthwith.

B. W. Strong, writing under date of the 17th, says: "I failed to see in the Journal any mention of the case, "The Coke Manufactur-

ing Company *v.* the Baltimore Consolidated Gas, Electric Light and Power Company," which was decided last month by the Maryland Public Service Commission. In view of its importance I venture to send this resume thereof: The O. K. Manufacturing Company, which is a concern doing business on North Holliday street, Baltimore, complained that the Company declined to serve it with electrical current, and asked for an order directing it to do so forthwith. The Company, during the hearing, explained its refusal on the ground that the factory is in the zone supplied with direct current, and that it would be too expensive to run a special line from its power station; also, it declared that the direct current could be transformed into alternating current by the use of a small motor generator, which the consumer could supply—the O. K. Company desired in the everyday course of its welding business to take a supply of direct current. It also showed that the cost of running a special wire to the factory would be $604, and that the direct rental would be $48 per annum, whereas the return to the defendant would not exceed $37. The Commission held that such a grant might result in compelling defendant to expend a vast sum of money in changing from one type of current to another, at the option of the consumer. The bill of complaint was dismissed, with the comment that the enforcing of such a request would be far reaching in effect, and discriminatory.

MR. F. E. SCHORNSTEIN, the New Business Manager of the Salina (Kas.) Light, Power and Gas Company, has organized an inspection force, and has planned thereunder a scheme which will virtually insure to every gas consumer a system of maintenance without added charge therefor. This is surely up to-date service of the "most up-to" sort.

A SPECIAL meeting of the local electrical contractors, jobbers and dealers in electrical goods, was held some time ago, the object of the meeting being to ascertain whether or not the franchise of the Union Gas and Electric Company, Cincinnati, O., permitted it to engage in the sale and placing of electrical fixtures and fittings on direct order from users of current.

THE City Council, of Rock Hill, S. C., has granted a tentative franchise to Messrs. Kuemmerle & Co., of Philadelphia, Pa., under which the latter are authorized to construct and operate a gas plant in Rock Hill for a term of 35 years, provided the franchise is ratified by the voters at a special election, to be convened for the purpose tomorrow, the 27th inst.

MR. PATRICK GEAR, since 1893 connected with the Holyoke (Mass.) Water Department, has been appointed to the vacancy as Superintendent of the Division, which vacancy was occasioned April 1, 1913, when John J. Kirkpatrick took over the duties of Manager of the gas and electric division of Holyoke's Public Works system.

ASSISTANT SUPERINTENDENT J. B. JONES, of the Bridgeton (N. J.) Gas Light Company, called the workmen together one afternoon not long ago, to inform them that, at a recent meeting of the Directors, it had been determined to award to them, at the close of each year, a sum equal to 5 per cent. on their yearly wage. The condition was that those receiving the award should have been on the payrolls for 12 consecutive months. In order that a commencement be made at once, the payment will this year be conditioned on steady employment for the 6 months beginning June 1st next, the payment for 1913 to be one-half that awarded in the year 1914; that is, 2½ per cent. About 40 men are concerned in the premium proposed, and at least 30 of these men have been on the rolls for 10 years or more. That they were all mightily pleased hardly needs the saying.

UNDER the ordinance agreement between the authorities of Great Bend, Kas., under which Messrs. Eakin & Duncan, of Manhattan, Kas., are authorized to construct and operate a gas plant in the first named place, these governing items are named: The candle value shall be a minimum of 18; the heating value shall not be less than 575 B.T.U.; that the minimum selling rate shall not exceed $1.30 per 1,000, when the monthly bill shows a consumption in excess of 3,000 cubic feet. These rates are to hold good until the population of Great Bend reaches 10,000, or until the sales of the Company shall aggregate 5,000,000 cubic feet per month. The Company offers to pipe all streets where the customers' number one for every 100 feet of mains laid; and it is agreed, that the Company shall be allowed to distribute natural gas should such be found "within reasonable distance from the center of the city."

MR. F. L. BANKS, writing from Chicago under recent date, says that Mr. Arthur Symms, representing the corporation that is preparing to erect coke ovens and by-product plants in Southern Illinois, recently visited certain populous districts therein, with a view to ascertaining whether or not the location under consideration will sustain plants of the type proposed. The plan is to construct extensive coke ovens at a suitable location on the Big Muddy river, from which gas will be piped to and through the settlements of Christopher, Benton, West Frankfort, Johnston City, Marion, Herrin, Carterville and Carbondale. We understand that the Company proposes to make all connections free of charge.

CERTAIN unreasoning citizens of Bridgeport, Conn., have appeared before the Public Utilities Commission, Hartford, Conn., and filed a petition asking that the gas rate in Bridgeport be reduced to 80 cents per 1,000 cubic feet—the ruling rate is $1.10. The petitioners number 10, and the head signers are Assemblymen McMurray and Wilson. It would be queer if the Bridgeport gas men should appeal to have the rate increased to $1.20 per 1,000, for they could easily show that, within the last 12 months, the increased charges for labor and enriching oils have added 10 cents per 1,000 cubic feet in cost of production and distribution, as between that of now and a year ago.

MR. GEORGE M. PENNYPACKER, President of the Ontario-Upland (Cal.) Gas Company, has informed the local authorities that it is not possible to comply with the request of Council to reduce the selling rate to $1.25 per 1,000 cubic feet, with a minimum monthly bill of 50 cents per 1,000. The present net rate is $1.50 per 1,000; gross, $1 75.

THE petition of the Consolidated Gas Company to the New York Public Service Commission, First District, for permission to purchase the shares of the New York and Queens Gas Company, and of the New York and Queens Electric Light and Power Company, which has been more or less under consideration by the Commission for almost a twelvemonth, was argued again the 16th inst. No decisive action was taken then, but the indications are that assent will be given. These Companies supply gas to certain districts of Queens county, Long Island, N. Y., the main territory supplied being in the district known as Flushing.

IT is rumored that Mr. Elmer E. Crawford, for many years Manager of the Sterling (Ills.) Gas and Electric Light Company, will take charge of the properties of the Rock River Light and Power Company.

SECY. TREAS. NORRIS, of the Montreal Light, Heat and Power Company, is arranging a new schedule of selling rates on both gas and electric account, which goes to show that the spirit that animated his associates and himself, when they assumed charge of these plants some years ago, has not changed. If we mistake not, when the change from the domination of Jesse Joseph and his tribe was made, gas was selling around $1.30, net, per 1,000—and such gas! Electric current, too, was then being distributed at 13½ cents per kilowatt hour. Now, the gas rate is 95 cents, net, and the electric charge is 7 cents, net, flat. And here they are proposing a further reduction!

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,060,573. Gas Range. J. A. Alexander and F. K. Berry, Battle Creek, Mich., assignors to A. B. Stove Co., same place.

1,060,621. Automatic Cut-Off for Gas Lights. W. C. Oswalt, Percy, Ia., assignor of one-half to J. C. Oswalt, same place.

1,060,755. Gas Producer. W. Hammick, Pittsburg, Kas.

1,060,807. Gas Producer System. G. Akerlund, Atlanta, Ga., assignor to Standard Gas Power Co., same place.

1,060,837. Gas Producing Oven. A. Gohmann, Stettin, Germany, assignor to Stettiner Chamotte-Fabrik Actien Gesellschaft vorm. Didier, Stettin, Germany.

1,060,996. Automatic Gas Analyzer. A. Mertens, Cruybeke, Belgium.

1,061,271. Meter Testing Apparatus. R. L. Dezendorf, Richmond Hill, N. Y.

The Market FOR GAS SECURITIES.

Mirabile dictu! A positive gain of 3 points in Consolidated for the week. Of course, it should have been up 30 points, were the market figures to be at all representative of its value; however, the summer is likely to see important doings, the Equitable, the Standard and certain rumblings anent the Mutual, point to further losses of identity in the great succeeding corporation, the tentative lines of which have been patiently worked upon by some of the cleverest engineers, lawyers and financiers of New York. The opening to day (Friday) was 132¼ to 132½, and the formal quotings were accompanied by much activity in trading. Next month the Mutual Gas Light Company's executives meet to declare the dividend for the first half. It will not be less than 5 per cent. regular, and some of the "Streeters" are positive in their declarations that it will be accompanied by an extra of equal amount. This, however, is not likely from our point of view. If any extra payment is made, 2½ will likely cover it. Of course, this admirably managed concern, well over 50 per cent. of which is in the treasury of the Consolidated, has quite a surplus still on hand from the earnings of the "good, old times," but the real melon will not be cut until the golden grain is being harvested; possibly not until the next "ice crop" is being housed. A feature in the week was the granting by the Public Service Commission to the Consolidated of the right to lawfully hold control in the securities of the gas and electric suppliers in the Flushing district, Queens County. It looks that lively times are close at hand in Greater New York gas affairs, from a financial point of view, and a purchase looks much better than a sale.

The huge Brooklyn Union Company has declared a regular quarterly of 1½, and an extra of 1, payable July 1st to record holders of the 14th prox. The gains in its far Eastern division are really amazing. The New England Gas and Coke Company has declared a dividend of 4 per cent., payable the 31st inst., and the Essex and Hudson Company, the main Newark member of the New Jersey Public Service Gas Company, will pay a dividend of 4 per cent. out of its rentals from the present corporrtion, on the 2d prox. Secretary Curran names the record period on this holding account for May 20th. The Laclede Company, St. Louis, Mo., has declared a quarterly of 1¼ on its common, and the regular semi-annual of 2½ on the preferred, both being payable the 16th prox. It is a queer thing in respect of these shares to note the opening quotations in these shares to-day: Common, 92¼; preferred, 99½. Each is well 20 points below real value. Peoples, of Chicago, is a bit stronger, at 109 to 109½; and if these shares are not worth 135, they are not worth anything. The bond market keeps improving. The regular quarterly dividend of 1¼ per cent. on U. G. I. shares is payable next Saturday.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

MAY 26.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par alue of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$99,816,500	100	132¼	132½
Central Union Gas Co.—				
1st 5's, due 1927, J. & J.	3,510,000	1,000	101	103
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	106	106
Mutual Gas Co.	3,600,000	100	157	157
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	101	102½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	59	63
1st Mtg. Gold Bds. 5 p. ct.	1,500,000	—	98¼	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	96	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	100	102
Standard	5,000,000	100	102	104
Preferred	5,000,000	100	90	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	103	105
The Brooklyn Union	15,000,000	1,000	130¼	132
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¾	107
Yonkers	299,650	500	180	—
Out-of-Town Companies.				
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	97	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	59	60
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	87	90
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90¼	91
Preferred	3,026,500	100	75¼	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	13,460,084		118¾	119
Mortgages, 5's	3,400,000		—	—
General Mortgage 4½	10,661,000		—	—
Con. Gas Co., Baltimore City, 4½	2,751,000		—	—
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	94	96
Bonds	75,000	—	—	100
Detroit City Gas Co.	6,580,000	—	—	50
Detroit Gas Co., 5's	381,000	1,000	75	80
" Prior Lien 5's	5,619,000	1,000	97	100½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	133	136
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, Richmond, Va., October 15-17, 1913. Officers: President, W. R. Addicks, New York City. Secretary, Geo. G. Ramsdell, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting Sept. 1913. Officers: President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, New York City, Oct. 8, 1913. Officers: President, C. G. M. Thomas, Long Island City, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Gas Meeters.—Monthly Section Meetings; Grand Commissioner, I. W. Peffly, New York; Gen'l Sec'y, H. Thurston Owens, La Crosse, Wis.; New York Section, Chairman, Will W. Barnes; Secretary, John M. Brock, 204 Percy street, Flushing, N. Y. Philadelphia Section; Chairman, L. R. Dutton'; Secretary, H. F. Patterson, Jr., 833 Chestnut street. Cleveland Section, Chairman, F. R. Hutchinson; Secretary, Wm. Holtz, East Ohio Gas Co. New England Section, Chairman, F. M. Roberts, Haverhill; Sec., F. K. Wells, 69 Broad street, Boston. Winona Section, Winona, Minn., W. F. Clausen, Chairman.

Guild of Gas Managers of New England.—Annual meeting, March, 1913. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, March 18th and 19th, 1914. Chicago, Ills. Officers: President, W. F. Barrett, Chicago, Ills.; Secretary-Treasurer, Horace H. Clark, 115 No. Oak Park avenue, Oak Park, Ills.

Illuminating Engineering Society.—Annual meeting,——— September, 1913. Meetings of Sections, monthly. Pres., Preston S. Millar; General Secretary, J. D. Israel, 29 W. 39th street, New York City. Sections: New York, Secretary, C. L. Law, 124 West 42d street. New England, Secretary, H. C. Jones, 10 High street, Boston, Mass. Philadelphia, Secretary, L. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, J. B. Jackson, 28 North Market street. Pittsburgh, Secretary, J. C. Mundo, Oliver Building.

Indiana Gas Association.—Annual meeting, March —— —— 1914. Terre Haute. Officers: President, A. S. Cooke, Terre Haute; Vice-President, A. C. Blinn, Evansville; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, May, 1914; ——— Officers: President, B. C. Adams, Lincoln, Neb.; Secretary, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, October—— 1913. ——— Officers: President, L. O. Ripley, Emporia, Kas.; Secretary and Treasurer, W. H. Fellows, Leavenworth, Kas.

Michigan Gas Association—Annual meeting, September, 17, 18, 19, 1913; ——— Officers: President, W. S. Blauvelt, Detroit, Mich; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1913; Mexico, Mo. Officers: President, P. A. Bertrand, Joplin, Mo.; Secretary and Treasurer, P. W. Markham, Brookfield, Mo.

National Commercial Gas Association.—Annual meeting and gas show, Dec. 1-6, 1913. Philadelphia, Pa. Officers: President, C. W. Hare, Philadelphia Pa.; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, Cleveland, O., May 20 22, 1913; Officers: President, M. B. Daly, Cleveland, O; Secretary, T. C. Jones, Delaware, O.

New England Gas Association.—Annual meeting, February, 18th and 19th, 1914, Boston. Officers: President, T. H. Hintze, Providence, R. I.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—Annual Meeting, July —, 1913, Asbury Park N.J. President, C. F. Butcher, Freehold, N. J.; Sec'y-Treasurer, O. F. Potter, Newark, N.J.

Ohio Gas Association.—Annual meeting, February ———, 1913, Columbus, O.; President, John M. Garard, Columbus, O.; Secretary, L. B. Denning, Columbus, O.

Oklahoma Gas, Electric and Railway Association.—Annual meeting, Oklahoma City, May, ——1914. President, F. E. Bowman, Ada; Secretary-Treasurer, H. V. Bozel, Oklahoma City.

Pacific Coast Gas Association.—Annual meeting, San Jose, Cal., September 16, 17, 18, 1913. Officers: President, Henry E. Adams, Stockton, Cal.; Secretary-Treasurer, Henry Bostwick, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, Allentown, Pa., April ———, 1914; Officers, President, J. A. Frick, Allentown, Pa.; Secretary-Treasurer, W. O. Lamson, Jr., West Chester, Pa.

Society of Gas Lighting.—Annual meeting Dec., 11, 1913; monthly meetings, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 29 West 39th street, New York city

Southern Gas Association.—Annual meeting, Mobile, Ala., April 4, 1914, Officers: President, James Ferrier, Rome, Ga.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. May 21, 22, 23 and 24, 1913, Galveston, Tex. Officers: President, F. M. Lege, Jr., Galveston, Tex.; Secretary H. S. Cooper, 405 Slaughter Bldg., Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 14 and 15, 1913, Milwaukee, Wis. Officers: President, I. F. Wortendyke, Janesville, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.